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Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XV JUNE 14, 1926 NUMBER 10

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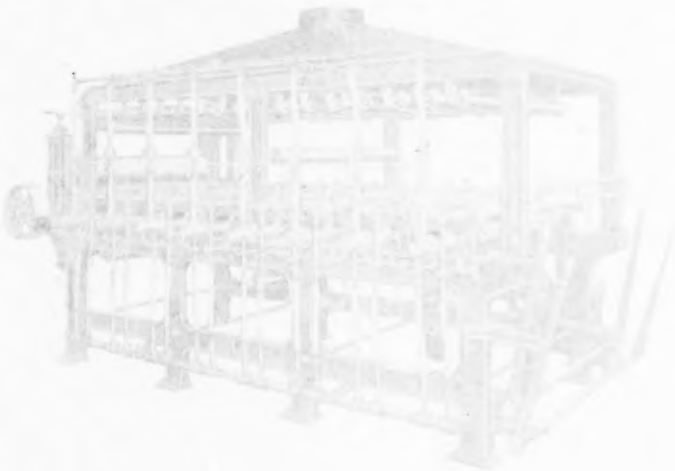

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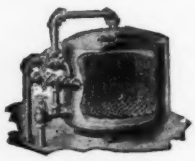

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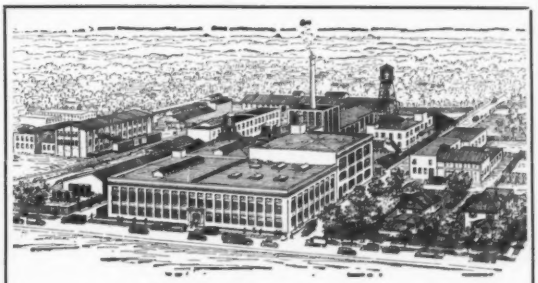

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Contents of This Issue

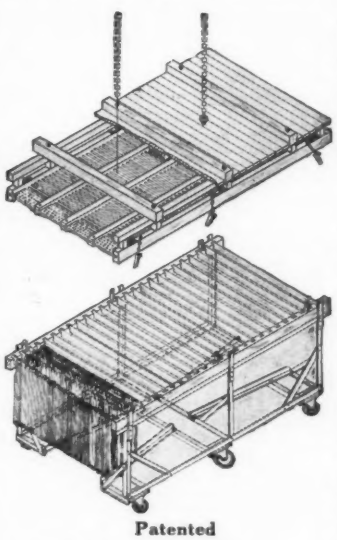
June 14, 1926

Sulphonated Oils 379
Joseph B. Crowe
The Dyeing of Men's Wear Piece Dyes by the Chromate Process..... 382
L. T. Smith
Soap Building—One of a Series on Scientific Washing 383
The Dyeing of Acetate Silk..... 387
Dr. B. Roetel

Proceedings of the American Association of Textile Chemists and Colorists

May Meeting of the Rhode Island Section.. 389
Co-operation Between Buyer and Seller—*An Address* by William M. Rand..... 389
Thirty-fourth Research Committee Meeting. 392
Association Prize for 1926..... 393
Communication:
Selecting Dyes from an Artificial Memory 393
Walter C. Durfee
May Meeting of the New York Section..... 395
Applicants for Membership..... 395
Changes of Address..... 395

Laundering of Fabrics Containing Rayon and Other Synthetic Fibers..... 397
Determination of Alpha-Cellulose Content in Artificial Silk 398
Dr. H. E. Wahlberg
The Dyer's School of Experience:
Blaming the Bleach House for the Padder's Fault 399
George L. Baxter
Competing for Blacks and a Waterproofing Recipe 399
Noel D. White
Editorial:
A Lesson in Curing Price Competition... 401
New Colors 403
Recent Literature 404
The Reduction Products of Azo Dyes—Part XIV 405
Walter C. Holmes
Technical Notes from Foreign Sources.... 408
Practical Hints on the Production of Bright Colors on Textile Fabrics—Part XX.. 410
Raffaele Sansone



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VOLUME XIV NEW YORK, JUNE 14, 1926 No. 10

Sulphonated Oils

History—General Method of Sulphonation—Theory of Sulphonation—Uses of Sulphonated Oils—Oils Which Are Sulphonated—Quantitative Analysis, Including Moisture—Ash—Total Alkali—Total Fatty Matter—Total Sulphur Trioxide—Inorganic Sulphur Trioxide—General Information—Classification of Soluble, Solvent and Emulsified Oils—Degree of Sulphonation —Inferior Oils—Tests for Solubility, Emulsivity, Acid and Iron

By JOSEPH B. CROWE

Assistant Instructor, Lowell Textile School

[NOTE.—*Many helpful suggestions were received from Dr. S. M. Hermann, of the Apex Chemical Company; National Oil Products Company, Arnold, Hoffman & Co., Inc., and Providence Drysalters Company.*]

PROBABLY the first patent taken out in connection with sulphonated oils was that of John Mercer in 1846. He used olive oil. Castor oil was first sulphonated about thirty-five to forty years ago, and came into general use for preparing cotton which was dyed with Alizarine Reds, etc. It acted as a mordant and helped to fix the dyestuff and also to brighten the colors.

Since that time the growth in the use of sulphonated or Turkey Red oils has increased with leaps and bounds. Likewise, to-day sulphonated oils are made not merely from castor and olive oils but from numerous oils of both vegetable and animal bases. The uses to which sulphonated oils can be put, and also the oils which are now sulphonated, will be discussed further on in this article.

GENERAL METHOD OF SULPHONATION

Each company has its own particular method for sulphonating the oils. Capacities of their sulphonators vary and details such as time and number of sulphonations differ, but in general the following method is used by all:

Five thousand pounds of oil are run into a sulphonator which has a capacity of 10,000 pounds, and the temperature of the oil is brought down to 22 deg. Fahr. The oil is kept at this temperature for several hours by the use of a compressed liquid ammonia machine passing the ammonia through coils under pressure. The oil is then whirled in a centrifugal movement by a propeller for several minutes, after which the power is turned off. Then an upward movement is brought into action. This upward movement is accomplished by having the oil churned from the bottom and hit against baffle plates on the side of the sulphonator, passing up through a cone-shaped funnel to the surface. Oleum (forming sulphuric acid) is then passed into the oil until a uniform mixture is obtained. The oil is then brought to rest and the temperature is allowed to rise to 28 deg. Fahr., after which are added an additional 5,000 pounds of oil. The operation is then continued by the use of sulphuric acid (66 deg. Be.), allowing the temperature in the meantime to rise gradually until it has reached 30 deg. The oil is kept at this temperature for five hours, continually keeping the oil in motion and allowing the acid to run in gradually. Now the valve on the sulphonator is opened so that the oil can flow into the wash tank, where it is left at rest for twenty-four hours. A saturated solution of warm salt water is then allowed to run or flow into the oil to wash it, and then the oil is set in a double-acting motion to be mixed freely with the salt water. Several washings are necessary. The oil is then allowed to separate from the water and siphoned off (from the water). The oil is now neutralized either to an acid, neutral or alkaline test, according to requirements. This is usually done with solutions of caustic soda, ammonia or some other alkali.

During the process of mixing, the temperature should not be allowed to rise above 40 deg.; otherwise a considerable evolution of sulphur dioxide (SO_2) will result, and the product will be dark in color and furnish poor results on dyeing.

The proportions of sulphuric acid to oil used are usually about three to ten.

One who endeavors to explain the theory of sulphonation has a hard task to perform. The following, however, is the theory which many believe to be the true explanation.

The sulphonation of castor oil will be considered. Castor oil is typical of the oils which can be sulphonated. All these oils contain a certain proportion of some free organic acid; in the case of castor oil the acid is ricinoleic.

Ricinoleic Acid—

$$C_{17}H_{32}\begin{vmatrix} OH \\ COOH \end{vmatrix}$$

Sulphonated Castor Oil—

$$C_{17}H_{32}\begin{vmatrix} O.SO_3H \\ COOH \end{vmatrix} = \text{ricinoleic-sulphuric acid}$$

The ricinoleic-sulphuric acid or the sulphonated castor oil is formed by the union of ricinoleic acid split from the castor oil with sulphuric acid, water being eliminated:

$$C_{17}H_{32}\begin{vmatrix} OH \\ COOH \end{vmatrix} + H_2SO_4 \longrightarrow C_{17}H_{32}\begin{vmatrix} OSO_3H \\ COOH \end{vmatrix} + H_2O$$

This is sometimes written:

$$C_{18}H_{33}O_2.OH + HOSO_3H \longrightarrow C_{18}H_{33}O_2.OSO_3H + H_2O$$

Uses of Sulphonated Oils

These sulphonated or Turkey Red oils are used largely in the textile industry. They are added to the dye bath of various colors to level them. They are used in dyeing gray goods, as they effect a more even penetration of the dye liquor into the cloth which contains the natural waxy substances of the cotton and added size. Almost all cloth to be printed is first oiled by passing through a warm dilute solution of Turkey Red oil and drying previously to printing. The oil here acts as a brightener for the print colors. This applies more especially to the mordant colors, especially Alizarine Red. It is also used in dyeing the ice colors by adding it to the alkaline naphthol solution, as in the case of Paranitraniline Red.

It is used in bleaching; it helps, by its high emulsifying properties, in the removal of the natural impurities, etc., of the cotton when added to the kier in the soda ash or caustic boil. Many of the so-called "bleaching oils" are made up largely of Turkey Red oil.

It is used in finishing to soften the fabric and to break down the effect of the starches and gums which are used. It is one of the very best softeners in the strict meaning of the term, as it really softens.

Sulphonated oils are employed to make spraying materials, especially for admixture with kerosene, mineral oil, etc., as they cause these substances to be readily soluble in water or at least emulsifiable.

They are used in combination with other materials for boiling-out purposes on both cotton and silk goods, and in the leather trade for "fat liquoring."

The wetting-out ability is a very important property of Turkey Red oil and is dependent upon the presence of (1) ricinoleic acid, (2) ricinoleic-sulphuric acid, and (3) salts of ricinoleic and ricinoleic-sulphuric acids.

Examples of Oils Which Can Be Sulphonated

The chief oil employed for sulphonation is castor oil. An ideal oil is a sulphonated castor oil that gives the most perfect solution with water—one in which the oil is actually dissolved and not simply emulsified, so that the globules of castor oil are interspersed in the water.

Olive, red and corn oils are probably the next most widely used oils for sulphonating purposes. Cheaper fats and oils of both animal and vegetable origin are also used.

Besides the above-mentioned oils, peanut, cottonseed and resin oils are sometimes sulphonated. Genuine sulphonated oils are sometimes adulterated with mineral oils.

Analysis of Sulphonated Oils

The quantitative analysis which will be considered will consist of the following determinations:

1. Moisture.
2. Ash.
3. Total alkali.
4. Total fatty matter.
5. (a) Total sulphur trioxide (SO_3).
   (b) Inorganic sulphur trioxide (SO_3).
   (c) Organically combined sulphur trioxide (SO_3).
6. Acid value.

1. *Water.*—The xylene method is the most accurate of all methods. About 50 grams of oil are mixed with 75 c.c. of xylene in a distillation flask. The flask is heated and the distillate collected in a funnel tube graduated in tenths of a cubic centimeter. The first portion of the distillate contains all the water (usually first 10 c.c.). The distillation is continued until the boiling point of pure xylene is attained. Then wash down the condenser with the xylene and tap the funel tube gently until any small drops of water clinging to the sides are brought down. Allow to stand until all the water separates from the distillate and read off directly the volume of water.

$$\%\ \text{water} = \frac{\text{c.c. water} \times 100}{\text{weight of oil taken}}$$

If frothing occurs on account of the soap present, add sufficient dry fused and powdered $KHSO_4$ to decompose the soap before distilling.

2. *Ash.*—Weigh from 5 to 10 grams into a porcelain crucible. Ignite gently, allowing the oil to burn until all the carbon has burnt off.

$$\%\ \text{ash} = \frac{\text{weight of residue}}{\text{weight of sample taken}} \times 100$$

3. *Total Alkali.*—Weigh from 5 to 10 grams of oil

into a 500-c.c. Erlenmeyer flask, dissolving the oil in about 50 c.c. of water—warming, if necessary. Cool and add 50 c.c. saturated salt (sodium chloride) solution and 50 c.c. ether (sulphuric or petroleum ether) and a few drops of methyl orange solution. Titrate with hydrochloric or sulphuric acids of known normality until the water layer which separates gives a light acid reaction. Calculate to milligrams KOH per gram of oil.

$$\text{Mg. KOH} = \frac{\text{c.c. acid} \times \text{normality of acid} \times 56}{\text{weight}}$$

$$\%\ \text{total alkali as KOH} = \frac{\text{c.c. acid} \times \text{normality acid} \times 0.056 \times 100}{\text{weight of sample}}$$

4. *Total Fatty Matter.*—Ten grams of oil are heated in a conical flask with 50 c.c. of water, 25 c.c. of dilute hydrochloric acid (1:5) being added and the liquid boiled for three to five minutes until the fused fat becomes clear. Allow to cool, transfer to a separatory funnel, into which the flask is washed with a little water and with 200 c.c. of ether. Shake well and allow to stand, the acid aqueous liquid being removed and the ethereal solution washed with three successive quantities of 15 c.c. of water, these wash waters being added to the aqueous acid liquor and this kept for the determination of total sulphur trioxide (see 5a below). The bulk of the ether is distilled from the ethereal solution in a conical flask and the residue is transferred to a tarred beaker. When the remainder of the ether has evaporated, the residual mass is dried for one to two minutes over a naked flame (until the fat ceases to froth), and then for thirty minutes in an oven at 105 deg. Cent. and weighed.

$$\%\ \text{fatty matter} = \frac{\text{weight of fat found}}{\text{weight of sample}} \times 100$$

5a. *Total Sulphur Trioxide* (SO_3).—The aqueous liquid obtained from (4) above is precipitated with barium chloride, filtered, ignited and weighed as barium sulphate ($BaSO_4$).

$$\%\ \text{total } SO_3 = \frac{\left|\frac{80.06}{233.43}\right| \left|\frac{SO_3}{BaSO_4}\right| \times \text{wt. of } BaSO_4}{\text{weight of sample}} \times 100$$

An alternate method for determining total SO_3 in case the fatty matter isn't to be run is as follows: Eight to ten grams of oil are weighed into a crucible (platinum or porcelain) and an excess of sodium carbonate (Na_2CO_3) is added. The Na_2CO_3 is added to convert into the sodium (Na) salt any SO_4 which might be present as free H_2SO_4 or as $(NH_4)_2\ SO_4$. The Na_2SO_4 is stable to heat. Ash the oil, dissolve ash when cool with water, add excess hydrochloric acid (HCl), heat to boiling and add slowly with stirring an excess of barium chloride. Digest one to two hours. Filter, wash with hot water, ignite and weigh.

5b. *Inorganic Sulphur Trioxide.*—The SO_3 present as ammonium or sodium sulphate is determined by treating 10 grams of oil with 50 c.c. of saturated sodium or ammonium chloride solution (quite free from SO_4). Stir well for fifteen minutes, and then filter through a moist filter paper. Wash well with the saturated salt solution. To filtrate, add excess HCl, heat to boiling, add barium chloride ($BaCl_2$), digest, filter, wash with warm water, ignite to constant weight and weigh.

$$\%\ \text{inorganic } SO_3 = \frac{\frac{SO_3}{BaSO_4} \times \text{weight } BaSO_4}{\text{weight of sample}} \times 100$$

5c. *Organically Combined SO_3.*—

$$\text{Total } SO_3 - \text{inorganic } SO_3 = \text{organic } SO_3$$

6. *Acid Value.*—Five to ten grams of oil are weighed into an Erlenmeyer flask and dissolved in 50 to 75 c.c. of neutral alcohol or ether—alcohol mixture to which a few drops of phenolphthalein are added. Titrate with half-normal caustic soda or caustic potash until the solution turns a pink color which doesn't immediately disappear.

Acid value is the number of milligrams of KOH required to neutralize the free acid in 1 gram of an oil.

Acid value may also be calculated as the percentage of oleic acid in the original oil.

$$\text{Acid value} = \frac{56 \times \text{c.c. of caustic soda or potash} \times \text{normality of potash}}{\text{weight of sample}} = \text{milligrams of KOH}$$

or

$$\frac{0.282 \times \text{c.c. caustic soda} \times \text{normality caustic soda} \times 100}{\text{weight of sample}} = \%\ \text{oleic acid}$$

Before mentioning general information on solubility, importance of sulphonation, etc., it might be appropriate to explain one classification of a soluble, solvent and emulsified oil.

A soluble oil is a mixture of a castor oil soap and a sulphonated oil having an acid reaction. They are sold as para oils, soluble oils, Turkey Red oils, etc., but they are different from true sulphonated oils. No matter how acid the sulphonated oil may be when coming in contact with the castor oil soap, no oily material will separate out.

A solvent oil is a mixture of a solvent hydrocarbon and sulphonated oil. Such are benzapole, tetrapole and chlorinol oils.

An emulsified oil is merely ordinary sulphonated oil

worked with a certain amount of non-sulphonated oils such as lard, neatsfoot, etc.

The degree of sulphonation is of extreme importance, because the more highly an oil is sulphonated the greater is its solubility, and the more soluble an oil is the greater its efficiency and uses to which it can be put. The amount to which an oil is sulphonated differentiates between a good and a poor oil. Sulphonation is measured as per cent of organically combined sulphur trioxide.

Many sulphonated oils which are sold to-day are inferior because they are contaminated by an excessive soap content. To obtain the necessary solubility, some neutralize the acid sulphonated oils with large amounts of alkalies. When these inferior oils come in contact with acids, salts, etc., the soaps are broken down and the oil is decomposed and thrown out of solution. While many times no direct trouble is caused, yet the efficiency of the sulphonated oil is so lowered that we do not obtain the good results which we expected.

The following are reliable qualitative methods for determining solubility, emulsivity, acid test and iron:

(1) *Solubility and* (2) *Emulsivity Tests.*—(1) Two to three cubic centimeters of the oil and the same volume of water should give complete solution, and (2) addition of about 50 c.c. water should then yield a persistent homogeneous emulsion of a faintly acid reaction.

Dilute ammonia should also dissolve the oil completely and the solution should remain clear on dilution with a large quantity of water.

Acid Test.—Dissolve one part of oil in three to four parts water. Add one part 28 per cent acetic acid and shake. Run two samples, one being the standard oil suitable for your work and the other being the oil you are testing. Let both samples stand after shaking. To be satisfactory, the oil you are testing should remain in solution as long as your standard oil does.

Iron Test.—The oil is shaken with dilute sulphuric acid and a few drops of a freshly made potassium ferrocyanide solution, ether being then added and the liquid again shaken and then left to stand. If iron is present, a more or less intense blue ring appears at the zone of contact of the two liquids.

COAL-TAR EXPORTS AND IMPORTS LESS

Both imports and exports of coal-tar chemicals in the United States for the first quarter of this year were considerably under those of 1925, according to advice from the Department of Commerce, Bureau of Foreign and Domestic Commerce. Exports of colors, dyes and stains advanced in poundage from 6,064,100 pounds in the January-March period of 1925 to 6,087,700 in January-March, 1926, but declined in value from $1,814,300 to $1,517,500.

The Providence office of the General Dyestuff Corporation moved on June 1 from 52 Exchange Place to 40 Fountain Street, Providence, R. I. The new telephone number is Gaspee 1585-86-87.

Dyeing of Men's Wear Piece Dyes by the Chromate Process

The Process and Suitable Colors for Various Shades

By L. T. Smith

THE dyeing of men's wear piece dyes by the chromate process has some desirable features over the top or bottom chrome process for light and medium shades. The shade is more easily controlled, more delicate tones may be obtained, and a great saving of steam and time may be effected. The drawback to this method of application of colors has been that many of the chromate working colors did not exhaust well and, used in groups, the rates of exhaustion were such as to make it difficult for the dyer to control the shade.

It is the object of this article to outline briefly what has seemed to be a favorable method of applying these colors and give the names of those colors which seem to work best by this process.

In processing, the pieces are entered into the kettle and warmed up to 90 to 100 deg. Fahr. The dye, which has been dissolved by boiling in half a barrel of water, is then pailed on. This is followed by 3 per cent, on the weight of the goods, of a mordant consisting of one part bichromate of potash and three parts ammonium sulphate which has been dissolved in half a barrel of cold water. This is followed by a mixture of 1½ per cent of 26 deg. ammonia and one-fifth of 1 per cent of 56 per cent of acetic acid which have also been diluted in one-half a barrel of cold water. The goods are then raised to the boil in one and one-half hours and boiled to shade. In the case of new shades where a large add is to be given, it is necessary to start up with a fresh bath, but with small shading adds they can be giving by cooling back to 140 and coming up slowly again to the boil.

The following list of colors will give any desired shade in light and medium tones, and when properly built up will give level, well-penetrated goods of sufficient fastness to meet the requirements of the men's wear trade. The colors in this group all exhaust at nearly the same rate of speed and, except for the Alizarine Red W, will leave the bath practically clear. By the use of the proper colors as listed, goods containing white and light colored silk-effect threads may be dyed and the silk will be left practically unstained.

Red.—Alizarine Red W (Schultz No. 780). Any of the domestic types. This color stains silk-effect threads if used over 1 per cent. It cannot be used for feeding on. For brightening and for feeding on use Alizarine Rubinole 3G.

Orange.—Chrome Orange R (Badische). This color can be used on plain goods or for those containing white or light colored silk-effect threads.

Yellow.—Alizarine Yellow 2G (Schultz No. 48). Any of the domestic types. This color can be used on plain goods or those containing light colored silk-effect threads.

Green.—Alizarine Cyanine Green (Schultz No. 865). Any of the domestic types, for plain goods. For goods containing white or light colored silk-effect threads use Alizarine Green P (Chemical Company of America), Alizarine Green 4C (Ultro-Zinsser), Alizarine Green C3G (General Dyestu). For feeding on, Anthraquinone Green GXN (Schultz No. 864).

Blue.—Alizarine Astrole (Schultz No. 856) or Alizarine Cyanole Green Blue B (Cassella). For goods containing white or light colored silk-effect threads substitute for the above Alizarine Blue SAE (Schultz No. 858). Any domestic type. The SAE changes more on boiling than does the Astrole.

Violet.—Anthraquinone Violet (Schultz No. 853). For plain goods and those containing silk-effect threads.

Brown.—Acid Anthracene Brown PG (Bayer). For plain and silk-effect goods. Some lots of this color stain silk more than other lots, and must be guarded against by testing before using. Good lots will leave silk white up to 2½ per cent.

Olive.—Diamond Green 3G (Bayer) (Schultz No. 276). For plain goods and those containing white or light colored silk-effect threads.

Gray.—Alizarine Black B (Schultz No. 862). (Imported types only.) Some manufactures and some lots of this color stain silk much more than others. This can be guarded against by testing out. A good gray is obtained by using twenty-nine parts of type strength Black B, eleven parts of Green C3G and four parts of Brown PG.

Soap Building

One of a Series on Scientific Washing

The "Why" of Soap Building—What a Builder Should Do—The Classes of Soap Builders—Consideration of Commonly Known Builders

Prepared by Cowles Detergent Company

[EDITOR'S NOTE.—*The preceding papers in this series appeared in Vol. XII* (1923), *Vol. XIII* (1924) *and Vol. XIV* (1925), *covering the subjects of soap, dirt, heat, alkali, bleach and water.*]

PURE soap is the standard of balanced cleansing value in the washing of textiles.

In respect to one property some other deterging material may have less cleansing value than soap, while in respect to another property it may excel soap. Alkali, for instance, has an ability to neutralize acid dirt, which soap lacks, but in emulsifying mineral oils soap is far superior. On the other hand, the addition of alkali to soap increases certain detersive properties of the soap and produces a more effective agent for washing than either of these materials alone. It will be readily understood that the selection and use of a stimulant or aid to soap becomes of equal importance in producing strictly first-class work to the selection of the soap itself. A builder, so-called, may be harmful to fabric; it may resist rinsing, it may strip colors, or it may even detract from the action of the soap if not wisely chosen. Therefore, we are discussing the subject in a special paper and hope to suggest something of importance to users of soaps and builders.

THE "WHY" OF SOAP BUILDING

To build soap means to increase its cleansing speed and efficiency by the use of a properly selected "aid," "booster" or "builder." The addition of the builder may be practised in either dry or liquid form. In the former case, various expedients are resorted to for mixing. Many plants have installed an ordinary barrel churn. Others use a pony washer, covering the cylinder with sheet iron.

Home-made mixers of stout barrels, constructed by the engineer and belted to the line shaft, are common. In some cases an ordinary box such as is used for mixing mortar is employed. A number of plants are using a method like the following:

Take a piece of 12-ounce duck, such as is used on the flat-work ironer, and make a bag about 4 feet wide by 5 feet deep. Put the soap and builder in same, tie it, and tumble in a dry washing machine until well mixed. Be sure foot valve of washing machine is open. A bag of this size holds the equal of eight to ten tanks of cooked soap. Enough materials can be mixed, when the plant is not busy, to carry through the next week.

For building soap in liquid form a steel or iron tank of at least 100-gallon capacity is desirable. In a simple installation the solution is carried to the machine in buckets, but in larger plants the liquid is piped directly to the washers. A soap tank must be equipped with a steam connection for heating contents.

The strengthening or building of soap to increase its cleansing power must never be confused with the question of using alkalies for softening water. Since materials used for water treatment have certain value as soap builders also, this mistake is occasionally made. Dirt is one element in the consumption of washing supplies; the hardness of water is another. It is cheaper and more effective in the production of clean white work to remove the hardness by outside treatment of the water, thus leaving only the dirt as an element requiring the addition of supplies to the wash water.

In terms of final results the soap builder is used to

improve cleaning action. There are five separate and distinct ways in which this improvement is brought about:

1. By stimulating the colloidal activity of the soap.
2. By supplying additional colloidal activity.
3. By increasing the ability of the soap solution to hold its suds (a matter of increased surface viscosity).
4. By increasing the emulsifying power of the soap solution (a matter of lowered surface tension).
5. Incidentally by neutralizing any water hardness not removed by previous treatment.

A review of the discussion on soap* will fully explain the conditions under which colloidal activity, emulsification and suds-sustaining properties are utilized. No doubt those who have read that paper recall the essential facts. Discussion on alkali† also contributes valuable information. It is unnecessary here to recall the details, but as a preliminary to considering *what* forces are needed in building soap we must all be in agreement on the fact that soap *can* be built to advantage. The above are the five ways or means by which it is done.

What a Builder Should Do

Now to a consideration of the factors one must look out for in choosing the builder. These are seven in number. Each has been fully discussed earlier in this series of talks, and therefore is referred to here in brief form only to make up a bird's-eye view of the science of building.

1. When dissolved in water the builder should yield a sensible amount of causticity (controlled). Technically speaking we use the term "hydroxyl ions." This form of builder makes itself felt by:
   (a) Increasing the miscibility or "mixability" of water and the oily forms of dirt. One would say that the emulsifying and wetting properties of the solution had been increased.
   (b) Neutralizing acid constituents of dirt. Many forms of dirt are acid in type.
   (c) Stimulating the colloidal activity of the soap. The colloidal bodies exhibit more speed and force in breaking up and suspending solid dirt.
   (d) Retarding the decomposition of soap into alkali and fat. Since the washing effect of a soap is produced when undecomposed, all possible effort should be made to prevent the hydrolysis or decomposition.

2. When dissolved in the soap solution the builder must have the effect on what is known as the "surface" condition of the liquid, of increasing and holding the suds. This means:
   (a) Lowered surface tension which permits air readily to mix with the solution as the wheel revolves.
   (b) Increased surface viscosity or "body," which assists in maintaining the suds (emulsion of air and water).

3. The yield of causticity must be so controlled and balanced as:
   (a) To be sufficient for cleansing requirements.
   (b) To be harmless to the fabric.
   (c) To have no unfavorable effect on the suds-sustaining properties. Too much causticity retards suds.

4. When dissolved in water, the builder should contribute additional colloidal properties:
   (a) To stimulate and extend the life of the soap.
   (b) To facilitate the removal of solid dirt.

5. The builder should make the soap an easier rinser.

6. The builder should reduce any hardness present in the water:
   (a) To save soap.
   (b) To avoid forming the sticky lime soap.

7. When dissolved in water the builder should be stable against the decomposing effect of heat.

These seven considerations all have their part in scientific soap building. There is one other that is important, namely:

8. The builder should be of a nature that reacts with dyes, maintaining their insoluble character so as to prevent bleeding or fading. This is a consideration not hitherto met by detergent manufacturers.

The Classes of Soap Builders

The soap-free compounds available for a choice as soap builders may be divided into three classes. Such a classification should not include the volatile solvent cleaners used by the dry cleaning industry. Here are the three classifications of soap builders:

1. Caustic soda (sodium hydroxide) in solid or liquid form. Caustic potash (potassium hydroxide).
2. Alkaline salts of weak mineral acids. This division includes:
   (a) Soda ash (carbonate of soda).
   (b) Bicarbonate of soda (baking soda).
   (c) Modified soda (mixture of soda ash and baking soda).
   (d) Trisodium phosphate.
   (e) Borax, etc.
3. Ammonium compounds.
4. Colloidal alkali.

How Soap Builders Measure Up

On referring back to the table of essentials for a soap builder, it is observed that there are seven specifications which serve as a measure of materials proposed as helpers of soap:

1. Available alkali.
2. Creating desirable surface condition.
3. Control over alkali.
4. Colloidal properties.

*American Dyestuff Reporter, Vol. XII, p. 176.
†American Dyestuff Reporter, Vol. XII, pp. 563 and 796.

5. Easy rinsing.
6. Reduce hardness.
7. Resist changes in decomposition under heat.
8. Mordanting properties.

The most commonly known substances that are used in soap building as classified in the preceding paragraph may now be considered in an intelligent manner:

Caustic

There are two materials known as caustic builders, one of them caustic soda, the other caustic potash.

Specifications

1. Caustic soda fulfills this requirement in that it is a strong base, and supplies a generous amount of causticity (available alkali) to the washing solution or soap solution to which it is added.
2. It supplies no unhydrolized molecules, which is a cause of its being weak in this requirement.
3. Its high causticity is completely out of control—a raw, damaging condition that is serious in its effect on textiles.
4. No colloidal properties whatsoever.
5. A difficult rinser because of its absorption by textile fiber.
6. Not useful on permanent hardness, and but moderately so on temporary.
7. Fully decomposed.
8. No color-fixing action. Bleeds dyes.

[Note.—Under specification No. 2 it may be argued that caustic does fill the bill because it increases the suds of a given soap solution. This increase, however, is caused by the tendency of the caustic to throw the soap into the surface, not by a concentration of its own molecules in the surface. An excess of caustic will throw the soap entirely out of solution, a fact employed in soap manufacture to separate the soap from the balance of the boiling liquor.]

From these data it is obvious that while caustic soda may be used as a soap aid or stimulant, its use requires great care, and will be accompanied by a tendering of the goods. Some of the essentials of a scientific builder are entirely missing from caustic.

Caustic Potash

What has just been said in regard to the use of caustic soda applies to caustic potash. The latter is virtually a twin to soda, a potassium metal base replacing the sodium. It might be stated, however, that through the difference in molecular weights of potassium and sodium hydroxides, 1 pound of caustic soda will do the work of 1.4 pounds of caustic potash. This fact, together with the higher cost and other important objections cited above, obviously retires it from serious consideration. Caustic potash finds valuable applications in the field of industrial, chemical and fertilizer manufacture, but its use in the washroom cannot be recommended.

Soda Ash

This material when dissolved in water breaks up in part.

1. A fair supply of causticity is liberated (about 11.5 per cent Na_2O being available).
2. Considerable of the original compound remains undecomposed to stimulate surface conditions in the interest of an increased suds.
3. Its concentration of sodium oxide is dangerous from the standpoint of destructive action on the goods. No control whatsoever.
4. No colloidal properties.
5. Rinses with considerable difficulty.
6. Good water softener on permanent hardness.
7. Heat does not change its composition to any extent.
8. No color fixing action.

[Note.—The use of soda ash requires great care, and the employment of a slight excess is quickly evidenced by a yellowing of the goods.]

Bicarbonate of Soda

This material must be boiled in order to release any sodium hydroxide. In water solution under usual conditions it yields no causticity. Boiling decomposes it, forming soda ash and carbon dioxide gas.

1. Very little available alkali.
2. Its yield of unhydrolized molecules is extensive because of its inability to hydrolize to caustic soda. It is therefore a good suds sustainer, but at the expense of cleansing value.
3. No control over any alkali that may be released.
4. No colloidal properties.
5. A poor rinser.
6. Practically worthless in water-softening reactions.
7. Extreme heat changes it to soda ash.
8. No mordanting action.

[Note.—As a cleansing agent the use of this material is a virtual waste.]

Modified Soda

These mixtures, representing various combinations of sodium bicarbonate (baking soda) and sodium carbonate (soda ash), yield the combined properties of the two at low temperatures with some modification.

1. The yield of causticity from the soda ash in the presence of bicarbonate is less pronounced. That is, a given quantity of soda ash will yield a certain amount of causticity when dissolved alone, but the same quantity of soda ash dissolved in the presence of bicarbonate, as in

the case of modified soda, will yield less causticity (about 5 per cent with the usual soda).

2. The yield of unhydrolized molecules is marked. The effect is noted on surface conditions and suds-supporting properties. This accounts for the fact that a soap solution to which modified soda is added tends to thicken or jell more so than the same amount of soap in a soda ash or caustic solution. The property is actually carried to an extreme, for the suds are of a solid character that interferes with thorough circulation among the cloth fibers. The soap is carried out of solution and stacked up as a foam instead of remaining as a free flowing suds within the goods.

3. To caustic soda (causticity) bicarbonate reacts as an acid. Therefore any causticity liberated will be neutralized by the bicarbonate to form soda ash. Here is the reaction: Caustic plus bicarbonate equals soda ash plus water.

The result is that a solution of modified soda is less caustic or sharp than a solution of soda ash containing the same amount of ash that is carried by the modified soda.

The above is the only means of fiber protection obtainable when the carbonates (soda ash and modified soda) are used in washing.

Although the main object in adding bicarbonate to carbonate is to thus modify the action of causticity released from the soda ash, the value of the bicarbonate in this direction is limited, because bicarbonate is rapidly destroyed by heat. The temperatures necessary for efficient cleansing, or in the soap tank, cause decomposition into carbon dioxide gas and soda ash, to a considerable extent. Therefore much of the bicarbonate serves no useful purpose as a modifying agent.

4. No colloidal properties.

5. A poor rinser. This hard rinsing feature is particularly obnoxious where the washing process demands considerable alkali (causticity) to neutralize acid constituents of dirt, because excessive quantities must be added. Naturally, this excess must be removed by rinsing, and failure to do so results in yellow or gray work.

6. Softens water only to the extent of the soda ash carried.

7. When using modified soda as a source of alkali, care must be exercised in the matter of temperatures to prevent decomposition of the bicarbonate. Otherwise the modifying property of the bicarbonate is lost. On the other hand, by so doing one loses the benefit of the small amount of caustic which would be liberated if the solution were well heated.

8. No mordanting power.

[NOTE.—Sodas are of least value when used dry in the wheel. This is the condition under which the hydrolysis is suppressed, and the "modifying action" is apparent. When used as a soap builder in solution and subjected to high temperature in the soap tank—i. e., converted into soda ash to a considerable extent—better deterging results are obtained, but under these conditions the modifying property is virtually lost.]

TRISODIUM PHOSPHATE BORAX

1. These materials are very weak alkalies, yielding moderately small amounts of causticity.

2. Their yield of unhydrolized molecules is sufficient to give good suds-sustaining properties.

3. The moderate supply of causticity liberated is not under any form of control to lessen its direct action on cloth fiber.

4. No colloidal properties.

5. Borax rinses with difficulty. Trisodium rinses more readily.

6. Trisodium phosphate is a good water softener of permanent hardness. Its greatest value in the laundry is for this purpose. Borax softens water also, but in a much less efficient manner.

7. Both compounds are stable against the effect of heat.

8. No mordanting power.

[NOTE.—The low cleansing efficacy of trisodium and borax, coupled with high costs, eliminates them from consideration as builders in modern washing practice.]

AMMONIUM COMPOUNDS

Ammonium is a very volatile obnoxious gas. It is soluble in water, and in this condition is commonly found on the market as "ammonia water."

1. Furnishes enough available causticity to give an alkaline reaction.

2. The unhydrolyzed condition tends to improve surface properties, although the readiness of these materials to become gaseous is a disturbing factor in heated baths.

3. No control, and if used in anything like concentrated form is apt to injure fabrics.

4. No colloidal properties.

5. Is relatively an easy rinser. Its extreme volatility quickly takes it from the goods upon drying.

6. No water-softening properties.

7. Ordinary temperatures of the washwheel quickly drive it out of solution, and if any appreciable quantity is used the washroom quickly becomes filled with suffocating fumes. A quantity of ammonium far less than would produce any washing effect in the wheel evaporates quickly and, in the case of some products sold as builders, gives the erroneous impression that the solution is being benefited as a cleansing medium.

8. No mordanting property.

Otto Ruhlin, formerly superintendent of dyeing and finishing for the Wilton (Me.) Woolen Company, has succeeded T. Edward McDermott as overseer of finishing in the mill of the W. & K. Company, Nasonville, R. I.

The Dyeing of Acetate Silk

Special Dyes for Acetate Silk—Dyeing Fast Shades

By DR. B. ROETEL

Translated from Melliand's Textilberichte, Jan., 1926, by Carl Toepler

IN the last few years a new artificial fiber, acetate silk, has appeared in the market. It has aroused considerable interest and acquired some importance in the textile industry, even though it has appeared in rather limited quantities, in comparison to the viscose and cuprammonium silks.

The acetate silks possess little or no affinity for most of the ordinary dyestuffs, in contrast to the other artificial silks in commerce, whose dyeing properties as a group, approach those of strongly mercerized cotton. This property has been taken advantage of, and as a result acetate silk is being used in increasing amounts in the production of white effects in cotton, wool and half-wool fabrics, since in dyeing these fabrics with the proper dyestuffs the acetate silk remains undyed as a white effect thread on a dyed ground.

This indifferent behavior towards dyestuffs is a great disadvantage in those cases where the dyeing of the acetate silk is concerned. Formerly the acetate silk was carefully treated with alkalies, and in this manner a partial saponification of the acetyl-cellulose took place

The saponified acetate silk behaves like viscose silk and can be dyed with direct dyestuffs. The saponification, however, has a number of disadvantages and in practice is difficult to carry through. Due to the intensive research of the dyestuff companies it is now possible to dye acetate silk in other ways, whereby the valuable properties of the fiber are retained and the saponification methods have passed into history.

Special Dyes for Acetate Silk

Naturally, due to the danger of saponification of the acetyl-cellulose such dyestuffs as require more or less strongly alkaline baths are out of the question, as for example, the vat or sulfur colors. The basic dyestuffs, as a class, possess a certain affinity for acetate silk. Full shades cannot be obtained in this manner, however, even when working in concentrated baths. A mordanting with tannin-antimony or other mordants for cotton, does not solve the problem. Basic dyestuffs could first be dyed in deep shades on acetate silk, after the BASF introduced into commerce the "Mordant for Acetate Silk." The Celloxane of the Farbwerke vorm. Friedr. Bayer & Co. and the Setacyl Salt of Geigy are products which as additions to the dyebath promote the dyeing of the basic dyestuffs on acetate silk. Through exhaustive study of acetate silk the dyestuff companies were able to produce dyestuffs specially suited for the dyeing of this fiber alone.

The oldest products of this class are the developed dyestuffs. They occur in commerce as the Azaniles of Hoechst, the Acedonoles of the BASF, the Azonines of Cassella, and the Azoles of Agfa-Griesheim. The Ionamines, of English origin, also belong to the developed dyestuffs.

These products are mostly colorless in direct dyeings. Some of them color the acetate silk yellow or orange. Only after diazotizing on the fiber and developing with phenols and naphthols are the full shades obtained. The developed dyeings are fast to washing and cross-dyeing. The fastness to light is sufficient for ordinary purposes. The developing creates more or less bother and it is not possible through mixing of the developers to obtain other shades, but in spite of the discovery of the direct dyeing fast dyestuffs, the developing dyes are still of interest, especially in those cases where a good fastness to cross-dyeing is desired, for example, in the production of colored effects in cotton, wool or half-wool fabrics, where it is desired to obtain deep shades. It has not been possible to produce a black on acetate silk satisfactorily by other means.

The developing dyestuffs are dissolved in formic or hydrochloric acid. Certain products can be brought into a finely divided suspension with soap. Some are soluble in water alone. They dye acetate silk without further addition, at 50-70 deg. Cent. The goods are rinsed after dying and diazotized in the usual manner with sodium nitrite and hydrochloric acid. After rinsing again the silk is developed at 40-60 deg. Cent. with phenol, resorcin, beta-naphthol or other suitable developers.

In this manner cotton is not dyed or only slightly stained. The affinity for wool and silk is somewhat greater, although a subsequent soaping removes most of the staining, so that in this manner acetate silk can be dyed in mixed fabrics. The cotton, wool or silk can then be covered with such substantive or acid dyes that do not dye acetate silk. Dyeing in a boiling bath, however, must be avoided.

Soluble dyestuffs that possess an affinity for acetate silk have also been discovered. They are dyed with

an addition of Glauber salt at 60-70 deg. Cent. They are the Cellit Fast Colors of Bayer, the Acetate Colors of Agfa-Griesheim, and the Setacyl Colors of Geigy. These colors possess the advantage of being mixed with one another. They are especially suited for the dyeing of mode shades on piece goods. On account of their affinity for animal fibers, they do not come into consideration for the dyeing of acetate silk in wool or silk mixtures. The fastness to light of these dyestuffs is in general very good. The fastness to water in most cases is sufficient.

Dyeing Fast Shades

Dyeings fast to water are obtained with the dispersion or suspension dyestuffs. In this class are the "Dyestuffs for Acetate Silk" of the BASF, Hoechst, and Agfa-Griesheim, the Azonine Direct Colors of Cassella, and the Cellacet colors of Kalle. Colors of English origin are the Duranol, Dispersol, Celanese SRA, and Celatene dyestuffs. Thees products are insoluble in water and in a finely divided form, and are added to the dyebath with the addition of soap. They dye acetate silk at 50-70 deg. Cent., can be mixed with each other, and on account of their good levelling properties are suited for the dyeing of mode shades of all kinds, on yarn and piece goods. The dyeings possess good fastness to water and washing, and with few exceptions possess good light fastness. They also withstand cross-dyeing in a warm neutral or weakly acetic acid bath.

The dispersion dyestuffs are also suited for the dyeing of acetate silk in mixed fabrics. Cotton is left white. Silk and wool are slightly stained, but a subsequent soaping removes the stain to such an extent that these fibers may be cross-dyed with substantive or acid dyestuffs that possess no affinity for acetate silk. The temperature, however, must not exceed 50 deg. Cent.

In the mixed fabrics of acetate silk and cotton, the dyeing may proceed with the addition of the necessary dyestuff for the cotton, in addition to the acetate silk dyestuffs, at 60-70 deg. Cent. After dyeing for one-half hour, an addition of Glauber salt is made, to facilitate the dyeing of the cotton color, and the goods are worked for another half hour at this temperature. The dyestuffs used for the cotton must leave acetate silk white.

Even if it were possible to obtain nearly all shades on acetate silk at the present time, the problem of dyeing this artificial fiber will not be completely solved until it is possible to dye it in as simple a manner as viscose silk.

The dyeing of acetate silk is still in its infancy, and the answer to the question as to whether acetate silk will surpass the other artificial silk on the market, or if it will become a serious competitor of natural silk, must remain to be answered in the future.

SAFETY IN TEXTILE MILLS

The news letter regularly distributed by the Textile Section of the National Safety Council, Chicago, contains many interesting and practical suggestions regarding the prevention of accidents in textile mills. In a recent letter, for example, it is stated that in the textile industry the two outstanding causes of injuries are falls and handling of materials. The letter says further:

Falls are distinctly a textile plant ailment, and are due most frequently to washing the floors. Many plants have adopted signs, etc., which have prevented injuries and also caused injuries. This Section is recommmending the use of a wooden saw horse which is light and easy to handle, striped black and yellow or black and white. On the central beam of the saw horse is painted the single word "WET." These horses are placed at all approaches to the wet spot or in all four directions. Many concerns have reported considerable success in the prevention of falls of this nature by adopting this simple method.

Handling materials, the second largest cause of injury, results principally in strains. Many strains are the result of a predisposition to rupture or hernia. Considerable success has resulted by providing physical examinations for men who are obliged to do heavy work. A simple but excellent suggestion has come to us, and that is to keep the material being handled as nearly as possible at the same level. When material must be carried from one machine to another, have the conveyor built to the proper level so that the lifting or lowering of objects may be reduced to a minimum.

Here is a good idea in the handling of aniline oil. A concern had an injury to an employee from aniline oil and is anxious to broadcast its experience so that others may profit. They write as follows:

> "It has been our custom to draw only a small quantity of oil from the drum at a time, so that it might not be left standing around in an open pail. On the day before the accident, a small quantity remained in the pail and an employee was changing his pants at noon near this pail. The waistband of his pants fell into the pail and evidently absorbed some of the oil. The employee did not work that afternoon but came in the following morning, put on the pants and started to work at 7 a. m. He worked until 9 a. m., at which time the oil had gotten thoroughly into his system, and he became unconscious. He was hurried to the hospital and it was with great difficulty that his life was saved. We have now taken the additional precaution of keeping the oil in small tanks fitted with spigots, so that it is never exposed to our employees."

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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MAY MEETING OF THE RHODE ISLAND SECTION

The May meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held jointly with the Salesmen's Association of the Dye and Chemical Industries on Friday evening, May 21, at the Turk's Head Club, Providence, R. I. The meeting was preceded by a dinner.

Chairman Williams called the meeting to order at 7.15. An interesting address was given by B. M. MacLyman, Assistant District Attorney General, who spoke of present-day conditions of crime in its various forms and explained the working of the law and various civic organizations to suppress crime waves.

William M. Rand, sales manager of the Merrimac Chemical Company, gave an interesting address on "Co-operation Between Buyer and Seller," which appears in full below. Entertainment was furnished by John J. Houlker, a magician, and was received with enthusiasm.

At the conclusion of the meeting the speakers were given a rising vote of thanks by the fifty-five members present.

A. N. DANA, *Secretary.*

Co-operation Between Buyer and Seller

By WILLIAM M. RAND

Sales Manager, Merrimac Chemical Company

Co-operation between buyer and seller is one of the high lights in the picture of modern business. It is the twentieth century method which supersedes the worn-out policy of *caveat emptor:* "Let the buyer beware."

All of us have marveled at the strides business has taken in its ownward march. When we recall the old methods of manufacture and barter, we wonder at the changes that have taken place. We pat ourselves on the back for present-day efficiency. Each of us has something to do with maintaining and improving present standards. We are upholding the accumulated results of the efforts of all generations.

Our present business policies are the results of experiences—the survival of the fittest. In the last two decades we have learned much about the treatment of employees; we have established many varieties of co-operation between the employer and the worker. We have gained ground in the suppression of bad practices. Business has won the confidence of the people. Twenty years ago a certified public accountant was considered an unnecessary member of society. Business houses claimed they were able to take care of their own accounts! To-day what bank would lend money without the certified statement of the expectant borrower? Business houses used to publish their statement of assets and liabilities and were reluctant to give their profit and loss. To-day financial statements of large corporations lay their entire affairs on the table, not only for the stockholders' but for the public's inspection. A feature of this era of improved business methods is the co-operation which is continually growing greater and greater between buyers and sellers.

There are three corners to the triangle of successful purchasing, namely: price, quality and service. The buyer may have the advantage of any two, but the seller must have one. It is difficult for any concern to maintain prices lower than their competitor for great lengths of time. All responsible companies are seeking for the highest quality of material. Competition is being decided on the matter of *service*.

"Service" is a hackneyed term. Generally it means prompt delivery, courteous attention to complaints, and the carrying on of all business transactions to the absolute satisfaction of the buyer. But there is a broader, larger meaning to the word; that is, making the organization of the seller a part of the organization of the buyer, and, vice versa, that of the buyer a part of that of the seller, each helping the other to solve some of their problems.

Competition Forces Co-operation

There may be many reasons for the improvement of conditions. The pleasantest, of course, is that it has all been done through altruistic motives. We would like to believe this—but hasn't some of it been forced upon us by competition? In periods when the supply exceeds the demand, when manufacturers and merchants desire to keep their plants producing and selling on a former basis, prices drop, better terms are given, and, finally, in an attempt to do something that their competitors can't do, the seller studies what form of service or co-operation with his customer he can establish, knowing that once this co-operation *is* established he has the advantage against his competitor at equal prices and quality. It makes little difference what the causes were through which this broad co-operation has come about—it is here, and it is found to be a profitable policy to the seller, a distinct benefit to the buyer, and, greatest of all, it is a real service to business in general. Whether it was brought about through high motives, came as a natural growth or was forced upon industry makes little difference, for it is here to stay.

The history of the chemical industry varies but little from that of other industries. It has passed through its vicissitudes; it has had its ups and downs for the last twenty years. In 1914 it was in a highly competitive state. The answer to the competition at that time was not so much co-operation with buyers as with competitors. Many companies were merged in that period. Then came the war. The world struggle focused attention on chemistry. Then it came to be realized that Germany had one advantage. Its young men had turned to science, while those of other countries had entered business, the army, the navy and other fields of endeavor. The result was that Germany was able to hold off the combined forces of the civilized world for over four years. She had made herself independent for her supplies of nitrogen, as well as dozens of other necessities. America at this time found herself without a real full-fledged chemical industry. Through the ingenuity of the American chemist the country soon was able to produce its own nitrogen synthetically; was able to replace many of the dyes and pharmaceuticals so necessary to the welfare of the people and of the fighting forces. The American chemist in the few short years since the war has brought his industry to a standard equal to any foreign country.

Fall and Rise of the Sales Department

After the World War it was believed that the war plants, erected to meet the demands of war, would so overproduce in peace time that there would be an oversupply that could not be sold. The streets would run ankle-deep in sulphuric acid. Fortunately, the shelves of American merchants were empty and after a brief recession in 1919 a boom occurred in 1920. Business was on the heights. The crash came in the fall of the year. Prices dropped; values vanished; large, old-line companies lost all they had. During the years 1915 to 1920 there was no need of a sales department; in fact, all the members of sales departments were too busy explaining delayed deliveries and the reduction of the amount of orders to have time for anything else, if there had been anything else to do. For once the men in the sales department could not throw out their chests and say to other departments, "We are the business producers; without us you fellows wouldn't be working." But after 1920 the salesmen had to go to work. From 1921 to the present day the competition has been severe. Companies have failed. Plants have stopped operations. This is the period when the spirit of co-operation between the buyer and the seller has grown, and we may be thankful that it has grown for the good of all. We have to admit that the spirit of co-operation is greater when we leave our competitor twirling his hat and waiting in the anteroom while we go in to see the buyer. But all of that feeling, which is perfectly natural and human, does not give to this spirit of co-operation what it really needs, namely: wholeheartedness and, regardless of the immediate benefit to the seller, the assurance that in the long run it is the best policy for all concerned.

What a chance the chemical industry has! For the first time chemistry has come into its own. For the first time have business people listened to the chemist and realized the tremendous benefits accruing from his work. For the first time have mistakes in the past, which may have been prevented by the calling in of a chemist, been realized. We believe that in no industry is there a greater chance for good than in the chemical industry in this work of helping solve the problems of other industries. The chemist is now respected, his word given due considera-

tion—a change from the days when he was considered too theoretical—by practical business men.

How may we go about the actual working out of this co-operative spirit?

What may the seller do? In the first place, it is necessary that the seller have keen interest in the business of the buyer. A contact between technical departments must be made and confidence in each other established. This, of course, is difficult, for the buyer does not care to have a chemist of another corporation rummaging around in his plant. He feels that the company is trying to "put one over" and get information for the profit of the seller; that he is prying.

Complaints Open Way for Contacts

One way to get this contact is through complaints made to the seller. If a chemical manufacturer or a chemical sales organization takes account of all of the complaints made on the goods that it manufactures or sells, and investigates each reasonable complaint, in every case he establishes a contact. Unfortunately, the contact at first is bound to be disagreeable. The seller comes to answer a complaint. The buyer feels that the goods are not up to standard and have caused him trouble and loss of time. The atmosphere is liable not to warm up until he is convinced that the seller has come to make amends; that he has not come to quarrel with him about the quality of the product, but to show him, if possible, that the product is not under standard; that some process of his manufacture which may cause the trouble may be improved. The seller must establish a policy that all complaints are justifiable until the person bringing the complaint is convinced that he is wrong. There is also a fortunate side to this manner of introduction, namely: that all reputable manufacturers of chemicals in the United States are putting out products of high standard. In nine cases out of ten there is a chance somewhere to find a difficulty in the operation of the customer's plant or the methods of using the chemical. In actual experience it has been found that most of the complaints are due to local conditions, "rule-of-thumb" handling and "by-guess-and-by-God" methods. When the complaints are finally straightened out, the buyer realizes that it has been his mistake; there is a feeling that the supplier is a proper party to supply his chemical needs. Wrong methods are discovered; methods which are not secret, therefore, may be used to correct difficulties in other plants, with the permission of the buyer. The technical man of the selling company must be tactful. The information received must be confidential.

There are many other ways in which contact may be brought about, as you all can imagine: personal friendship, the introduction of new methods of use, the request for opportunities to experiment at the buyer's plant.

In handling the work a technical man is necessary. This man must be resourceful, tactful and open-minded. He cannot be an expert in paper manufacture, tanning, textiles, oil refining, rubber manufacture, dyestuff manufacture, celluloid, wire, jewelry, cold storage, glue, soap, artificial silk, laundries, garages, etc., etc.; but he can study the chemical reactions of the problems which have to do with these lines of business when called upon. It is remarkable how many simple difficulties may be eliminated after a vexing problem is given concentrated thought from the angle of the technical man. It has been found that customers have been purchasing too high a grade of the chemical for their purpose; for example, the use of iron-free alum in the filtration of water in certain places where commercial sulphate of alumina would do the same work. It saves the customer a considerable amount of money when this information is given to him. There are cases where the amount of material could be cut down materially by changing the method of using. In these kinds of cases, gentlemen, is where the real service and co-operation begin. The company loses money and business for the benefit of the customer, but through this loss he has the guarantee of the customer's good-will for all time. If the customer can save through cutting down a seller's product he should be told, for our industry has not for its foundation—*fake*. It is surprising after the contact has been made, even in companies whose processes are secret, what further problems for mutual study arise.

Costly Old Methods

A great many of the difficulties of manufacturers come about through old, loyal employees, foremen, etc., who have done business for years and year by rule-of-thumb; and, we may add, have done business successfully, although it is possible that it would have been more successful had the business been operated on a scientific basis.

There was a Frenchman at a wire company in Worcester who had been using acid that was stenciled "sulphuric acid 66 deg." The source of supply was changed and the new seller sent the sulphuric to the mill in carboys stenciled "oil of vitriol 66 deg." Immediately there was a complaint. The new material could not do the work; it was entirely unsatisfactory. On approaching the foreman, who was in rather bad temper at the time, he cried, "Sulphuric acid bad enough; this oil of vitriol, she is hell!"

It has been found that foremen in plants using sulphuric acid for the cleaning of wire have often found that the acid was not doing the work and, therefore, was not strong enough, and have added a little more acid; not finding it strong enough then, added more, each time increasing the strength of the mixture, making it less and less active on the wire. Much to his surprise, the seller's technical man

arrived, added considerable water to the mixture until he got it to the proper strength, and then dipped the wire and found that it worked perfectly.

What the manufacturer wishes to know through co-operation with his customers are four things: First, are the products which he produces the best for the consumer's use? He wishes to obtain as much information as possible on the conditions under which his chemicals are used. Secondly, he wishes to find out new uses for his products. Thirdly, he wishes to ascertain what new products could be manufactured to be of benefit to the buyer. He wishes to know the chemical problems of the buyer. What does the buyer wish to obtain? Is it possible to get a chemical which will do the buyer's work better and quicker than he is now doing it? A chemical manufacturer has a duty to bring the chemical knowledge of his technical staff to the plant of the consumer, that it may be used to the advantage of the consumer in his processes, and to ascertain that the consumer is using the right chemical in the right way, to work with the object of giving him a better chemical for his particular use. This is co-operation by the seller of chemicals with the buyer.

The buyers may co-operate with the sellers in that they can give the seller the information as to the troubles with certain chemicals that they are using. They can suggest to the sellers new things that they desire. They can call the technical man of the seller to their plant to work out the problem. These are the advantages the buyer can give the seller. He can point to new uses, better uses, improvement in his product. The buyer must have full confidence in the chemical concern he deals with. I believe that there is no reputable chemical manufacturer in the United States to-day that would in any way break that confidence.

A Relic of Dishonest Business

There is one other matter that may be spoken of which this co-operation between the buyer and the seller can bring forth. Methods of doing business are improving, but in the old days one of the advantages that a concern with elastic business morals could enjoy was a bought friendship with a foreman or a plant superintendent, or the actual user of chemicals. This was often won by the payment of money, or the passing of favors to the buyer's plant man, be he superintendent, foreman, dyer or purchasing agent. This graft has not yet been eliminated and there is a concerted action now being taken, finally and for all time, to overcome this relic of dishonest business. We have known of instances where certain acids were used by dyers for which they paid as high as 8 cents a pound and upon analysis it was found that the acid was a mixture of two common and cheap acids with some organic matter and which could sell with good profit at three-quarters of a cent a pound. We have known of a foreman who couldn't use a certain company's chemicals on account of quality, although the chemical tests were identical with the ones that he was using, and upon investigation it was found that each time the second competitor's material was used the results would be unsatisfactory. Upon obtaining a barrel of the original supply and filling it with the second supplier's material it worked satisfactorily. There wasn't much doubt of the reason for the unsatisfactory results, and the plant manager who carried out these tests now has another foreman.

At the present time the chemical industry is at the dawn of its day. Industry is looking towards the chemist for the answer to many problems. It behooves the manufacturer, the manufacturer's agents and the salesmen to attempt to bring together the buyer and the technical staff of the manufacturer, so that the problems in their plant may be ironed out, even if that particular seller is not directly benefited. It behooves the buyer to choose the reputable manufacturer or the reputable agent of a manufacturer for the supply of his chemicals, an agent and a concern in which he may have full confidence and to put before that concern the problems that are bothering him in a chemical way. If these things are done wholeheartedly and without reservations, there will be a lasting benefit to the seller, to the buyer and to all industry.

THIRTY-FOURTH RESEARCH COMMITTEE MEETING

The thirty-fourth meeting of the Research Committee of the American Association of Textile Chemists & Colorists was held on April 16, 1926, at the Engineers' Club, Boston, Mass.

The following members were in attendance: L. A. Olney, W. D. Livermore, E. H. Killheffer, W. C. Durfee, G. A. Moran, W. R. Moorhouse, W. K. Robbins, W. M Scott, W. S. Williams, J. F. Bannan, W. H. Cady, P. J. Wood, Ed F. L. Lotte, W. D. Appel, H. W. Leitch, H. Christison, andr W. E. Hadley.

W. D. Appel stated that several suggestions and criticisms have already been returned from several laboratories who are conducting trials, using the tentative fastness methods as prepared by the Research Committee. While it has not as yet been possible to draw a definite conclusion from the suggestions and criticisms received, the indications are that when all of the returns are received the Research Committee will have assembled data which will be invaluable in their future deliberations.

Walter C. Durfee attended the meeting and exhibited a model of a filing unit in which properly prepared cards could be mechanically isolated at will from all other cards in the system. The system was controlled by plungers

passing through perforations in the cards; thus if it was desired to segregate all the greens in a color index, one would refer to a chart showing greens and insert the plunger through the designated slot, whereupon all green cards would appear. Another slot would control varying degrees of fastness to soaping, light, etc., thus gradually eliminating the several greens in relation to the standards against which they were tabulated. The system was apparently based upon a principle somewhat similar to that of Jacquard weaving.

Association Prize for 1926

At a recent Council Meeting it was voted to continue the Association Prize of $100 for the best paper published in the Proceedings during the year.

In order that a second prize of $75, a third prize of $50, and a fourth prize of $25 might be awarded, the Howes Publishing Company kindly offered to raise their Corporate Membership fee from $100 to $250 a year.

In awarding the prize for 1925 the committee considered only papers published previous to December, and the 1926 prizes will therefore be awarded for papers appearing from that time on.

If possible the next award will be made at the Annual Meeting for 1926.

COMMUNICATION

At a recent meeting of the Research Committee, Walter C. Durfee explained the possibilities of adopting the "Findex System" for the purpose of selecting dyestuffs in accordance with certain specifications and degrees of fastness. Karl R. Moore had co-operated with Mr. Durfee in the preparation of certain dyestuff cards which were used for demonstration purposes. Believing that this whole matter would be of general interest to the members of the Association, I requested that Mr. Durfee prepare a statement in regard to the application of this system, based on Mr. Moore's successful classification work, which might be published in the Proceedings. He has kindly done so, and its publication follows.

L. A. Olney.

Selecting Dyes from an Artificial Memory

An Interesting Application of the "Findex System"

By Walter C. Durfee

A box containing part of the experience of a well-known authority on the specifications of dyestuffs was recently prepared by following a system proposed by the Findex Company of Milwaukee, Wis.

This box, with a book of instructions, was handed to a young man together with the following test question for him to answer out of this memory box or Findex.

Question: "Please prepare a list of about a dozen acid-dyeing dyestuffs which might be available for our use after excluding all that are known to be of fifth rate fastness to washing, fourth and fifth rate fastness to light, third, fourth and fifth rate in regard to level dyeing, and

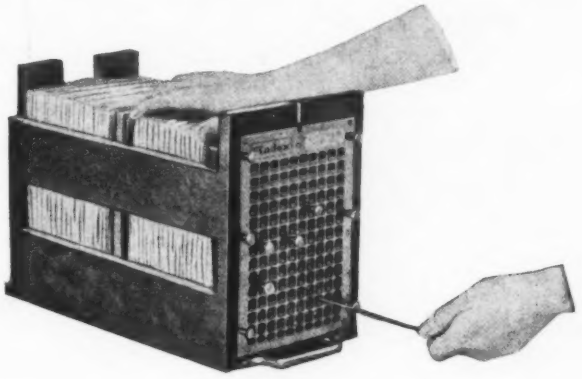


Fig. 1

omitting from the list if still possible those that are of poor rating in regard to rubbing and perspiration.

"From this list and the A. A. T. C. C. Year Book prepare a list of American names and makers of these dyes which are the only ones that will probably serve our present needs."

After waiting a short time the progress of the young man with the Findex was examined, and a few details of operating the memory box or Findex were further explained to him. With this assistance the answer was obtained. He then declared that he could do a second such question in less than one-half hour's time.

A picture of the finding index or memory box on which

Fig. 3

he worked is shown in Fig. 1, and a card from the box which represents the dyestuff Direct Fast Red is shown in Fig. 2.

Fig. 3 shows the punch used in preparing such cards.

Great amounts of information can be punched on such cards.

The card (Fig. 2) has slots which allow it to be dropped from consideration when it is not wanted or by inverting the box dropped into view when it is wanted.

The pencil marks which it carries were made by an experienced dye chemist before it was punched.

The first mark (position 2) allows the card to be free when afterchromed dyes are being examined. The slotted card moves or slides on a skewer or rod that is thrust through the memory box in a position number (Fig. 2). Other cards in the box not so slotted and not wanted are held fixed on small holes by the same skewer. The color of the dye for which the card stands is represented by the slot (Position 111, Fig. 2). The other slots represent several of the known fastness ratings of this dye, and allow the card to operate when these items are in question.

If the owner of the memory box should thrust skewers into the box in all the positions corresponding to these ratings, and then invert the box he would find this (see Fig. 2) card dropped separate from the rest of the pack together with a few others of similar ratings if present.

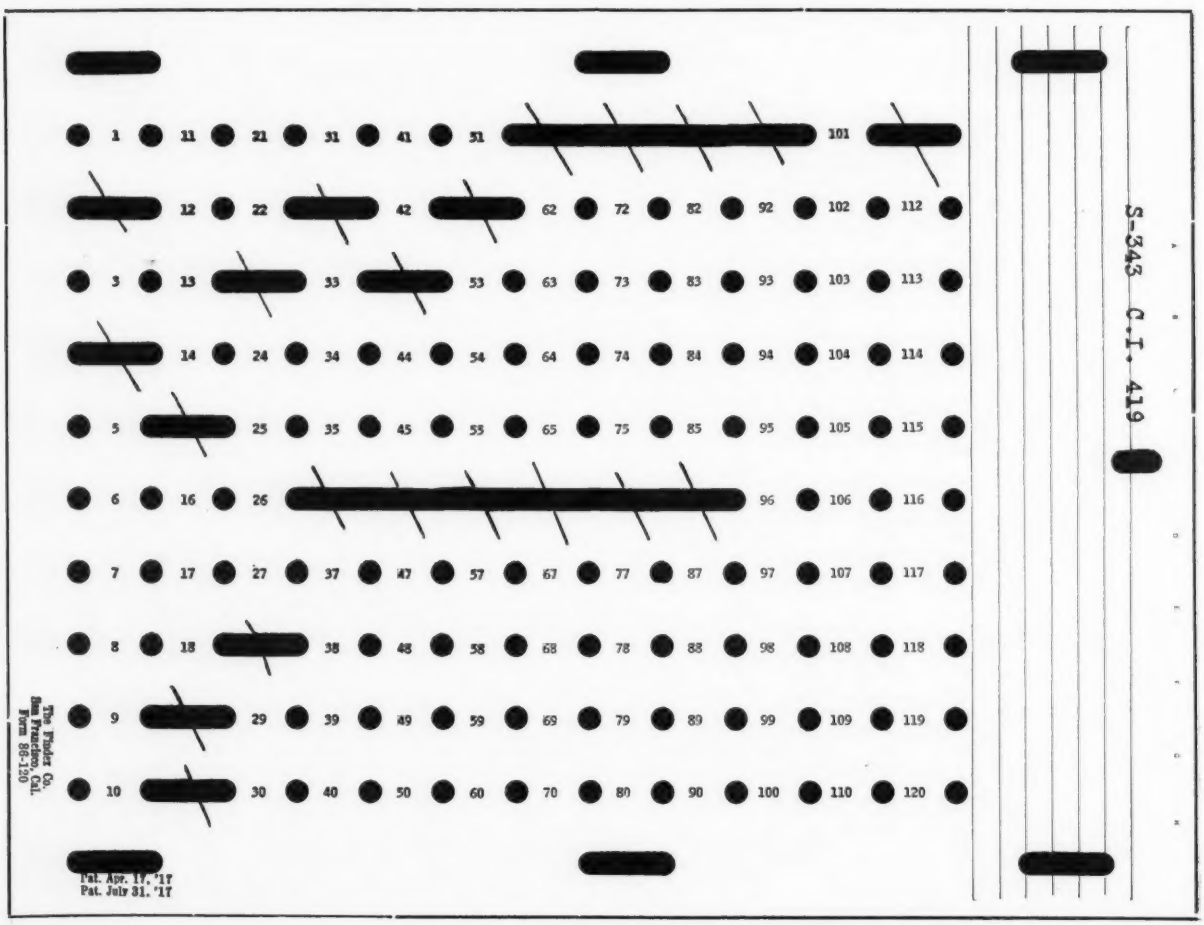
Fewer specifications would bring more cards; corresponding to easier dyeing requirements. With too many requirements the box would simply show the impossibility of satisfying all and would refuse to answer until the requirements were of more practical nature.

Numerous questions can be answered from this memory box in relation to dye application provided that the box is properly set up in the first place and provided that the operator wishes to ask one or more of the standard questions which the box is prepared to answer.

The card in Fig. 2 is arranged to help answer the following questions:

What dyes on wool are known to have or not to have, *according to color index,* first, second, third, fourth or fifth class ratings in regard to each of the following items:

Fastness to rubbing
Fastness to light
Fastness to dry-steaming



178 FIG. 2

Fastness to carbonizing
Fastness to stoving
(a. Alteration in shade)
(b. Bleeding into white)
Fastness to potting
Fastness to washing
Fastness to soda
(a. Alteration in shade)
(b. Bleeding into the white)
Fastness to milling
(a. Alteration in shade).
(b. Bleeding into the white)
Fastness to alkali
(a. Fastness to soda)
(b. Fastness to lime)

And what are available for each of several methods of dyeing and for each of the common color tones or hues. Also what dyes have any given combination of the above specifications.

MAY MEETING OF THE NEW YORK SECTION

The May meeting of the New York Section of the American Association of Textile Chemists and Colorists, which was also the annual meeting, was held Friday, May 28, at the Elmwood Country Club, Paterson, N. J.

The privilege of using the club's golf course was extended to members through the courtesy of Mr. Lotte and during the afternoon preceding the meeting many of the members availed themselves of this opportunity.

The principal business of the evening was the election of officers for the ensuing season. Candidates were presented to the meeting by a nominating committee appointed at the April meeting and these were balloted upon with the result that the following were elected: Chairman, Herbert Grandage; Vice-Chairman, Samuel L. Hayes; Treasurer, John J. Sokolinski; Secretary, Daniel P. Knowland; Sectional Committee: Edward F. L. Lotte, E. H. Killheffer, A. F. Wiehl, L. L. Crabtree.

An excellent dinner was served to approximately 75 members and guests who were present. Following the dinner, in the absence of any technical program, which had been purposely omitted, brief informal talks were given by former Chairmen P. J. Wood, E. H. Killheffer and E. F. L. Lotte and by the retiring and re-elected Chairman, Herbert Grandage. The meeting adjourned at about 10 p. m.

Respectfully submitted,

DANIEL P. KNOWLAND, *Secretary.*

Applicants for Membership

Active Membership

Bateman, John H., superintendent and designer, Southern Worsted Corp., Paris, S. C. Sponsors: James H. Purdy and Charles H. Stone.

Fletcher, E. L., chemist, Burkart-Schier Chemical Co., Chattanooga Tenn. Sponsors: William J. Kelly, Jr., and P. F. O'Neill.

Keegem, Charles H., dyer, Killingly Worsted Mills, Danielson, Conn. Sponsors: H. R. Davies and R. F. Culver.

Patterson, Edward V., purchasing agent, National Silk Dyeing Co., Paterson, N. J. Sponsors: Edward F. L. Lotte and C. Walter Lotte.

Schulz, P. Emil, salesman and demonstrator. Sponsors: A. A. Claflin and J. F. Bannan.

Wheeler, William S. Jr., research director, McCullum Hosiery Co., Northampton, Mass. Sponsors: R. W. Hook and W. J. Murray.

Junior Membership

Callicott, James H., assistant chemist and dyer, Davenport Hosiery Mills Chattanooga, Tenn. N. D. White and P. F. O'Neill.

Cope, R. Elwin, salesman, John Campbell & Co., New York City, N. Y. Sponsors: John Hartley and George C. Lommel.

Changes of Address

Ambler, Harry, 878 Lonsdale Avenue, Central Falls, R. I.
Benkert, A. L., 828 Bronx River Road, Fleetwood Hills, Yonkers, N. Y.
Brown, G. Arthur, 88½ Federal Street, Salem, Mass.
Glickman, B., 22 Baird Street, Dorchester, Mass.
Hincle, Joseph H., 1442 Robeson Street, Fall River, Mass.
McKinnes, Frank, 172 East 21st Street, Paterson, N. J.
Shea, Daniel J., Jr., 1341 S. Wilton Street, Philadelphia, Pa.
Sulger, Dr. August, 263 Academy Street, Jersey City, N. J.

TEXTILE SENIORS INSPECT ROANOKE RAPIDS MILLS

The seniors of the Textile School of North Carolina State College recently made their third educational trip of the year. On the trip they visited the Roanoke Manufacturing Company, the Patterson Mills Company, and the Rosemary Manufacturing Company, all three of which are located at Roanoke Rapids.

The Rosemary Manufacturing Company owns one of the largest jacquard mills in America. This mill makes all kinds of table covers and damask fabrics. The mills of the other two companies make a variety of fabrics, including dress goods and fabrics which are napped. This process of finishing fabrics, which produces a woolly effect on cotton fabrics was very interesting to the students. These mills also dye their own yarns and fabrics.

A. F. Patterson, president of the Rosemary Manufacturing Company, is a member of the board of trustees of State College and chairman of the Textile School Committee.

DYEING AND CLEANING INSTITUTE UNDER WAY

Construction plans for the buildings which will house the new National Association Institute of Dyeing and Cleaning, Inc., are being developed rapidly. This institute, the project for which was recently mentioned in these columns, will be located in Washington and will be under the direction of the National Association of Dyers and Cleaners.

As the accompanying illustration shows, there will be two units: a one-story structure containing a model cleaning plant which will operate like any other commercial enterprise in order to demonstrate processes and test machinery under practical conditions; and a corner structure of two stories, the first containing the offices of the association and an auditorium, and the second the classroom of the institute, a library and a laboratory. The building cost will be $125,000. It is estimated that the model cleaning plant will handle about $50,000 a year volume.

A singular circumstance connected with the project is the fact that all equipment for the model plant has been donated by allied trades members of the association.

The institute expects to graduate about 300 students every year in the craft of cleaning and dyeing. The course of instruction will probably include short courses in post-graduate work each year, with the aim of offering advantages to plant owners and practical men in the industry. All process instruction will be covered, with the training to foremen, as well as administration and accounting.

TWO CHEMIST CLUB SCHOLARSHIPS THIS YEAR

The Chemists' Club of New York will award two scholarships to students in industrial chemistry and chemical engineering, it was recently announced by the American Chemical Society. One is the Bloede Scholarship, with an income of $500, founded by Dr. Victor G. Bloede, of Baltimore, and the other the Hoffmann Scholarship with an income of $400, endowed by William H. Hoffmann, of Newark.

Competition is open to applicants in every State, and the winners may purchase their studies at any institution in this country which may be approved by the Club's Scholarship Committee.

A bill changing the name of the Board of General Appraisers to the United States Customs Court was recently signed by President Coolidge. By this measure the Board of Appraisers will be given greater prestige, commensurate with its functions in interpreting the tariff law. The members of the court shall hereafter be known as the Chief Justice and Associate Justices of the United States Customs Court.

LAUNDRY LEAFLETS EDUCATE THE PUBLIC ON FAST COLORS

Two attractive colored leaflets issued by the Bradford Dyeing Association, Westerly, R. I., and distributed by members of the Laundryowners National Association warn the general public and the housewife in particular against fugitive colors. The folders are inserted in the laundry boxes of 22,000,000 people who patronize members of the Laundryowners Association. From them the housewife learns the difference between fast and fugitive colors, what her responsibility is in avoiding the purchase of the latter class, what the laundry's problem is in washing colored goods and how the public can help to stop the sale of fugitive dyed materials by demanding guaranteed color fabrics.

These messages were prepared in collaboration with the New Jersey Laundryowners' Association and the Bradford Dyeing Association. The name of the laundry distributing them is imprinted on the leaflets.

Laundering of Fabrics Containing Rayon and Other Synthetic Fibers

Washing Formula Developed by National Cotton Association

THE rapid growth in the use of rayon yarns, either alone or in combination with cotton yarns, in the manufacture of fabrics has created many serious problems due to the lack of any very definite knowledge of the properties of the rayon yarns.

One of the problems of importance to the manufacturer, although only affecting him indirectly, has been the laundering of garments containing rayon yarns. In the past the failure of the rayon yarns in laundering has been fairly frequent and the cause for the failure has usually been given as poorly manufactured cloth.

Washing directions, when given, usually stated that the garments should be rinsed in warm water, using a neutral soap. These instructions, while applicable in home washing, were of little value to the power laundry, where production as well as cleanliness must be considered.

Realizing the seriousness of the situation, the technical department of the National Association of Cotton Manufacturers, co-operating with the Pilgrim Laundry and the Cotton Research Company, has developed a washroom procedure and washing formula which will cleanse the garments without seriously deteriorating the fabric. It must be pointed out that fabrics containing rayon as well as any other fiber must be properly constructed to withstand not only the handling in the wet state but also in the dry. Thin, sleazy fabrics that do not contain a sufficient amount of material to give a properly constructed cloth cannot be expected to launder successfully.

The results of this investigation can be summarized as follows:

Summary of Results

1. A satisfactory washroom procedure and washroom formula was developed.

2. Practically all of the woven fabrics showed an appreciable but not serious loss in strength in the rayon yarns after one washing. Continued washings in most cases did not cause further loss. The strength of the cotton yarns decreased practically the same amount as the rayon.

3. The construction of the fabric or whether the rayon is in the warp or filling apparently has little effect on the strength of the rayon in laundering. Shirtings with a stripe formed by long rayon floats laundered equally as well as fabrics made with the rayon yarn bound in at every pick.

4. Knitted fabrics made from rayon can be successfully laundered.

5. Woven and knitted fabrics can be most successfully pressed when in a damp condition.

6. It was found that fabrics containing rayon and cellulose acetate can be successfully laundered without serious loss in strength by using the following washroom procedure:

Washroom Procedure

(Pounds of cloth per load in wash-wheel, 160.)

Process

1. Cold rinse five minutes 40 gallons water at 60 deg.
2. Cold break five minutes 40 gallons water at 85 deg.
   6 ounces soda (sodium bicarbonate).
3. First soap 5 minutes 40 gals. water at 120 deg. Fahr.
   3 ounces 92 per cent neutral tallow soap.
4. Second soap 15 min. 40 gals. water at 140 deg. Fahr.
   5 ounces 92 per cent neutral tallow soap.
   3 ounces soda.
5. Third soap 5 minutes 40 gals. water at 140 deg. Fahr.
   2 ounces 92 per cent neutral tallow soap.
6. First rinse 5 min. 40 gals. water at 140 deg. Fahr.
7. Second rinse 5 min. 40 gals. water at 140 deg. Fahr.
8. Third rinse 5 min. 40 gals. water at 100 deg. Fahr., decreasing to 70 deg. Fahr.
9. Fourth rinse 3 min. 40 gals. water at 70 deg. Fahr.
10. Extract and dye.

Details of the Investigation

Through the interest of several mills, nineteen samples of fabrics made in part of rayon yarns or cellulose acetate yarns, six samples of hosiery, three samples of knit underwear made wholly of rayon yarns and one sample of underwear made of part cotton and part rayon were secured for the investigation.

A preliminary investigation was made to determine the effect of such factors as temperature in the wash-wheel, temperature in ironing, and the effect of pressing damp or dry. This preliminary investigation developed the washroom formula given and also showed that the fabrics could be pressed to their best advantage when in a damp condition. Temperatures as high as 150 deg. Fahr. in the pressing did not apparently affect the strength of the rayon. After these details had been carefully worked out and checked, samples of the cloth 15 to 20 yards long and samples of the hosiery and underwear were put into net bags, about 5 pounds to a bag, and laundered in accordance with the washroom formula.

Samples were taken from the fabrics and garments after one, five, ten and twenty washings and the strength compared to the strength of the original samples. In determining the breaking strength, the samples before testing were exposed in all cases to a known atmospheric condition for a sufficiently long time to insure that the moisture content of the sample and the surrounding atmosphere were essentially in equilibrium. The 1 x 1 x 3 Grab Method of Test, specified by the Federal Specifications Board, was used in determining the strength of all fabrics. In all cases the results are the average of at least three individual breaks. In the fabrics the test specimens were selected at random throughout the test length and in the hosiery two stockings were tested for each result.

Determination of the Alpha-Cellulose Content in Artificial Silk Cellulose

By DR. H. E. WAHLBERG

Svensk Pappers-Tidning, January 1, 1926

Translated by Dr. Paul Bartholow

IN the Svensk Pappers-Tidning, No. 17, there is a communication from Schwalbe as to comparative analyses of alpha-cellulose, which shows a poor agreement, both in the same laboratory and, above all, between different methods. The results were best with Jentgen's method and worst with Waentig's.

The author has not had the opportunity to pursue very comprehensive investigations of methods of alpha-cellulose determinations, but while working for a mill manufacturing artificial silk cellulose he made a number of observations which may be of interest.

In order to control the accuracy of the single analysis, a double analysis is carried out of the identical material and of nearly equal amounts. In the first place, Waentig's method is employed, as it conforms better than others to the treatment generally in use which the pulp undergoes in the viscose process. I assume, of course, that all the changes made in the best previous method, Jentgen's, have been tested as to their actions. In order now to avoid a double drying procedure, one of the analyses was carried out on air-dried material and the moisture content determined with the sample simultaneously dried according to Waentig, which is then treated according to the specifications of the analysis. The results of these double analyses were strikingly low. As the drying of pulp does not take place in the viscose process, it now appears to be self-evident that this change, as opposed to the Jentgen method, had been tested with reference to its actions on the results of the analysis. The analysis very soon showed that the inventor of the method had not carried out such a test when he made a list of the rules of his analysis. There is a change that the dried sample may stand over Sunday in the autoclave, whereby the temperature may rise to 110 deg. This somewhat higher temperature than that which is prescribed in the rule does not, however, explain the gaps in the result; for example, 65.9 per cent of alpha-cellulose in a material which should contain 83 per cent.

A summary of the double analyses, according to Waentig, with one sample air-dried, as appears from the table below, showed 3 per cent lower values for the dry sample. It is not surprising, therefore, that the double test given below on dried material shows a difference of 1.3 per cent. It would be impossible to carry out the drying of all the samples in a completely similar manner. A sample with more moisture must require a longer time; and since it is probably the length of the heating which is decisive, a factor varying in a high degree in its action is introduced with drying—and for the rest quite unnecessarily. Some of the results of the analysis, however, show that small amounts of impurities in the pulp have a very great influence on the injurious action of drying pulp.

A new method of analysis better than Waentig's must, therefore, be brought out. The author is doubtful, however, that an essentially better method than Jentgen's can be devised. With my double analyses carried out according to his method, analyses which in many instances were made at intervals of several weeks between them in order to follow any probability that small differences occur during the treatment, the average variations have amounted to only 0.2 per cent.

Analyses According to Waentig

Of dried material:	83.2	84.2	87.0	87.6	88.5	89.4
Of air-dry material:	81.5	81.1	82.4	84.6	81.2	85.5	86.5
Difference:	1.6	3.1	1.8	2.4	6.4	3.0	3.1

Analyses According to Jentgen

Of air-dry material:	88.0	88.7	89.1	89.0	89.2	89.1	90.1
Of air-dry material:	87.8	88.4	88.5	89.1	89.0	89.0	90.0
Difference:	0.2	0.3	0.6	0.1	0.2	0.1	0.1

In carrying out the Jentgen analyses special weight is laid upon the following details: That the weight of the sample amounts to 3.75 + 0.01 grams; that the sample, through repeated pressing and stirring, is thoroughly saturated with the lye and disintegrates immediately after being wetted. It is caused to stand the prescribed time, and immediately after dilution the moisture is withdrawn by suction. For this purpose a Jena glass crucible is used. With the employment of this apparatus, it is to be noted that the weight of each sample is diminished on an average 0.002 gram, corresponding to about 0.05 per cent in the result of the analysis. The reason is that small quantities of cellulose are held fast in the porous glass substance. The crucibles, therefore, should be cleaned after each analysis, suitably with 70 per cent sulphuric acid to which is added some chromic acid or potassium bichromate.

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narratives are part of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

BLAMING THE BLEACH HOUSE FOR THE PADDER'S FAULT

By GEORGE L. BAXTER
Bronx Company, New York City

A TWO-BOWL padder with drying cylinders attached had been made ready to run a light shade of slate. After strike-offs or hand swatches had shown a proper match, the operator was instructed to start the machine. Small white spots appeared at irregular intervals. The padder was stopped and the cloth returned to the bleach house to be resoured.

Another lot of cloth was brought to the machine and no further trouble experienced for several days, when the same white spots appeared at the start of a lot of pink sheeting. This time, instead of concluding that the trouble was in the bleaching, a check was made on the padder and the trouble was located in the upper rubber roll.

This roll had become slightly pitted and, while the pits were not deep enough to cause color spots, whenever the machine was washed or cleaned with chemic, the chemic remained in the pit holes, regardless of how much the roll was washed, and discharged or marked off on the first hundred yards or so of cloth run through the nip. Further trouble from this source was prevented by turning down the roll.

COMPETING FOR BLACKS AND A WATER-PROOFING RECIPE

By NOEL D. WHITE
Davenport Hosiery Mills, Chattanooga, Tenn.

When I was sent to one of New England's leading silk manufacturing plants to take charge of their dyehouse, I was told that there were no blacks to be dyed there. That struck me as strange, but I refrained from asking any questions at the time, making mental reservations to find out why later.

After I was there some time I made some inquiries and found that there were some blacks to be dyed, but that they were sent to a dyer in New York. Then, one day I received by mistake a lot of 25 pounds to be dyed black, fast to scouring. As I had no dyestuff to dye it with, I went to the office to send an order for it, at the same time thanking the manager, telling him how glad I was that he was giving me a chance to show I could dye black as well as colors. But he cut me off short, saying it was a mistake and that I was to return the silk to the shipping room to be sent to the New York dyer.

I tried to persuade him that I could do it, and do it cheaper than any outsider, but he evidently had his orders and would not consent to letting me do it.

I felt considerably hurt, but there was nothing I could do but bide my time. It came very soon. One day I was given a lot of black silk to wash. I was instructed to give it a warm soap, then several rinses of warm water. The silk had been returned by a customer and was labeled "bleeding badly."

I soaped the silk quite warm and took a beaker of the colored soap solution to show it to the manager, asking him what kind of black it was supposed to be, and was told that they ordered Alizarine Black, the same as they always had. Then I t ld him he got just what he ordered, because there was some Acid Black sold under the trade name of Alizarine Black which was nothing but Acid Black used specially for wool dyes, and that this lot was dyed with that kind of dye; that in order to fix this lot so that it could be used for what the customer wanted it I would have to strip it and redye it; that I knew how and would do it if he would buy me the dyestuff I wanted. He said, "Go ahead and do it."

WINNING ON TWO POINTS

I had won at last. Here is how I did it: As the silk was already soaped, I gave it two hot waters and a cold one. Then I whizzed it and set it away, rolled up in a cloth, until I received the dyestuff and chemicals I had ordered. Using telephone and express, I got them two days after. Then, with 10 per cent of Diaminogene B, 30 per cent Glauber salt and 5 per cent acetic acid, I put the new color on in twenty turns in one hour, rinsed it, diazotized with 3 per cent nitrite of soda, 5 per cent sulphuric acid, twenty-five minutes cold-rinsed twice, then developed it with 1 per cent Meta-Toluene Diamine boiled with 1 per cent soda ash in a cold bath for half an hour; rinsed and soaped it with 2 per cent soap at 100 deg. for fifteen minutes and, without washing, gave it a last bath with 3 per cent acetic acid, some olive oil emulsion and 2 per cent glue to give it some life. The silk was sent away and nothing more was heard about it.

A little while after that I resolved to have it out with the management. I went to the office and asked why, when I knew that I could please my customer better with my blacks, they refused to let me do it and preferred sending it out at a greater expense.

"For one thing," he told me, "we are not equipped to dye blacks." To my query as to how he knew that, he told me that the other dyers said so. Here I knew I had gained one point. "Then," he said, "we have so little de-

mand for black that it is hardly worth while attempting it now." Then I knew I had won the day.

"Now," I said, "I will convince you that you are wrong on both counts. You must have had dyers before who were not extra good on black and were glad of the chance to let it alone, and that was their excuse. We do not need any extra equipment to dye black than what we have now, for the black we need here. If we do not have any more demand for black,, I believe it is because the black you get from New York is not satisfactory to our customers. I have on hand enough dyestuff to dye 25 pounds of black. You give me 25 pounds of silk and let me use up the dyestuff I have. Then send a sample of my black to any of your customers that you know may use it and if it is not satisfactory for their purpose and better than anything they ever had in that line from here or any other place, I will never say another word about black as long as I stay here; but you must give me a chance to dispose of that dyestuff which otherwise will be a loss to the mill anyway."

I told him I felt slighted every time a lot was sent out to be dyed. He gave in. The New York dyer lost our trade. I felt sorry for him, but this is a struggle for existence and I was looking for a raise.

A Waterproofing Formula

Shortly after that a thing occurred which showed how some of the dyers' fraternity can be narrow-minded and foolish. I was asked to waterproof some green silk to be used to cover copper electric wires. The test for waterproofing was to spread a skein of the silk over the hand and let the water from an open faucet fall on the silk. The water instead of sinking in the fiber had to run off as it would from the back of a duck. I had a little book full of tricks and recipes like, I am sure, any old-timer used to carry on the inside of his vest pocket, and I dug it out to find the formula I needed, made my sample, and submitted it for approval. It went over with a bang, and got a contract for several hundred pounds a month.

Here is how it is done: In a 50-gallon barrel with one head knocked in, put 25 gallons of water and 10 pounds of rock alum. Boil until dissolved, then add slowly one pound soda ash, then 10 pounds sugar of lead. Stir and boil until dissolved, then add two quarts of acetic acid and leave it to cool and settle for several hours or over night. The clear liquid is decanted and used as it is. The goods, dyed, washed and hydro-extracted, are entered into the cold solution and soaked if possible over night, but at least six hours. Then squeezed out and dried without further treatment. Solutions can be used over and over requiring only to be replenished with fresh clear liquor. For the first 100 pounds I made up the solution in the above proportion twice and for the successive lots one solution was enough.

While we were working on this contract, from the office of another mill owned by the same concern came a request for my formula for waterproofing, stating that they had a big demand for waterproofing silk and that their dyer did not know how to do it. The manager told me that as long as we were all working for the same firm, he could see no reason why I should object to instructing them. I told him I had no objection at all, but that I felt convinced that if it were I who needed information from the other dyer, I was sure I would be denied same. But he did not believe it and said we had to co-operate with one another.

This was at the beginning of the big war. One day we received a shipment of peroxide of hydrogen with a letter stating that owing to the shortage of materials, it was the last shipment until further order. This left us in a bad position. Other firms we applied to for peroxide said they had only enough to supply their regular trade. We tried sulphur but had no proper facilities. Permanganate of potassium was fast disappearing. Everybody seemed to want bleached yarn just then.

To alleviate our trouble, we received a letter from our other mill in which they offered to ship us their supply of hydrogen peroxide, which they no longer needed. Of course we jumped at the offer and received 20 or more barrels of the stuff. As soon as I got it, I noticed the name of the manufacturer of that peroxide and I knew it was as good as any, although made differently, and started immediately to use it. It was quite weak from long storage, and I had to use a larger quantity, but just imagine the amount I received when we used to order two barrels at a time. Under the circumstances I thought it a Godsend. But the following day I got a letter from that mill stating that their dyer had thought best to advise me that the peroxide they had sent me was not made the same way as that I was used to, and might give me trouble; also that he did not wish to divulge his working secrets and I had to find my way out of any difficulty. They also said that they did not blame their dyer for his attitude.

It surely looked like a joke to me, but I say right here that I used that peroxide to the last drop and never had any trouble with it. But considering that he was the same dyer I had helped with my formula for waterproofing so recently, I thought that was some gratitude, but knowing also that that would have been the attitude of many dyers, I went to the manager to see what he thought about the co-operation practised in that other mill, and then I said to him, "I firmly believe that dyer does not know how to use peroxide in bleaching. He had that in stock and was glad to get rid of it, and, believing it was a lemon, after I got it, thought best to let me know it. As it is, the joke is on him."

S. Jared Mowrey, former superintendent of the Southbridge (Mass.) Printing Company, has accepted a position as divisional superintendent at the Arnold Print Works, Inc., North Adams, Mass.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

MYRON DREW REESER
Advertising Manager

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A LESSON IN CURING PRICE COMPETITION

GREAT and prolonged has been the perturbation in our dye industry over the keen price competition that prevails. But greater has been the wonder of many outside the industry that no remedial steps have yet been taken, although various forms of co-operation and combination have been suggested. It is needless to dwell on the fact that certain of our country's statutes would call down swift chastisement upon any sudden or too obvious amalgamation; or upon the fact that a perplexing form of commercial complex, let us call it, peculiar to the members of the dye industry, surcharges the atmosphere with a feeling that is hardly conducive to the confidence and good will which must exist before an amalgamation can be effected. So much has been spoken and written on these topics that they have become somewhat commonplace and uninteresting. And yet it is generally agreed that something must be done whenever an industry is beset with the evil of acute price competition if that industry hopes to prosper and grow, as every healthful industry should; further, that a closer understanding within a trade invariably has put an end to the price problem without actually killing the competition, which is necessary as an incentive to growth.

It is interesting in this respect to consider how another industry—an allied trade, in fact—rid itself of the price competition bugaboo. We may, if we will, recognize a clear picture of our own condition, and the remedy, in an outline of the commercial policy adopted by the British dyeing trade, as explained concisely in a recent address before the Society of Dyers and Colourists.

Prior to the formation of price-fixing associations in Great Britain's dyeing trade many businesses were being run at a severe loss and, says Mr. Buttercase, who made the address, "much of the energy which ought to have been directed to increase efficiency was expended in competition for orders and in studying how to do things *cheaper* rather than better." But note this well: "Eventually the firms concerned were driven to co-operate in order to prevent individual disaster or collective impoverishment." Apparently no other remedy was tried—can we not surmise that no better remedy exists? Here, in a nutshell, is the theory of the price-fixing policy, as explained by the British speaker:

> A price arrangement does not eliminate competition, but it insures that competition is of another character—not merely wasteful expenditure of effort in the diversion of trade from one house to another, but competition in quality leading to that specialization which combines the highest quality with the most economical working on standardized lines. The progressive firm built on efficient lines will not begrudge business taken from it on grounds of quality or service. It will reply by doubling its efforts to regain its reputation, and the consequent study of quality and markets is more calculated to increase the total volume of trade than mere blind competition on price.

What an admirable creed is embodied in this explanation for the guidance of our dyestuff industry! It serves only to increase the wonder that the industry has not yet adopted such a policy, but instead has persisted in bucking price reduction with price reduction, to the demoralization of the trade in general and the severe financial weakening of the individual units. Those who are guilty, either through ignorance of their production costs or through a warped conception of business ethics, are knowingly undermining the strength of the industry and are to that extent a menace to the trade of the community. Unknowingly they are themselves on a toboggan slide which follows the law of gravitation.

Why, may we inquire, are the advantages offered under a price-fixing agreement ignored—advantages so numerous and so attractive that any initial sacifice which members of the industry may find it necessary to make would appear insignificant in comparison with the eventual rewards? Were a schedule of prices, based on accurate knowledge of production costs, set up as a check to the pernicious practice of price-cutting, it would in the first place unquestionably stabilize the entire industry. Increased profits would be the immediate and certain result. The quality of our dyestuffs, already far beyond the least reproach, would soon become of even higher order, with obvious benefits to the American textile industry, for competition would be on the basis of quality rather than price. The strengthening of our position in the export markets for both textiles and dyes would follow. Increased

distribution in both home and foreign markets for American colors would soon bring about a very satis factory wage scale, attracting to the industry more highly skilled labor.

The success of the commercial co-operation would convince the industry that its next move should be toward technical co-operation. The advantages here are too well known to need comment. Duplication of effort which is so much deplored would soon disappear, and the resulting economies in production would leave a larger surplus for research. The German dye cartel—that outstanding example of industrial amalgamation—has recently recognized the necessity of reducing duplication to the minimum and, according to a recent report, has dropped no less than 6,000 different dyes from its list to effect economies which will be turned against its competitors in the export trade. Our industry may look upon such a significant move with envy, but can it ever hope to emulate the example while it continues in its present path?

It is always instructive for one industry to draw lessons for its guidance from the experiences of another, as it is then viewing its own conditions, as it were, at a distance. The perspective thus obtained enables the industry in question to recognize its own prevailing evils much more clearly than when it turns the light inwardly upon itself, which usually produces a kind of mental blindness. With this in mind we have here set forth, without embellishment, the numerous advantages that would undoubtedly accrue to our dye industry through the operation of a policy similar to that in force in the British dyeing trade. It seems to us logical enough that the cure for price competition in the one case ought to be equally applicable in the other. There should not be the least doubt in the minds of those in the industry that the gains, both commercial and technical, would be very satisfactory.

HYDRON PINK DECISION REVERSED IN CUSTOMS APPEALS COURT

The appraisement of a shipment of Hydron Pink FF Paste, imported by Kuttroff, Pickhard & Co., three years ago and held dutiable as non-competitive, has been sustained by the decision of the United States Customs Court of Appeals, which reversed the decision of the Board of General Appraisers. The decision of the court was rendered on the ground that at the time of importation no domestic competitive product existed.

The original appraisement of the imported dye based the dutiable value upon the American selling price of a Sulfanthrene Pink FF Paste manufactured by E. I. du Pont de Nemours & Co. On the first appeal, however, the single general appraiser upheld the entered value of the imported dye on a non-competitive basis, a decision which was not affirmed when Kuttroff, Pickhardt brought the case before the Board of General Appraisers. The importer's final appeal has been sustained by the court, which reversed the decision of the board's judgment and remanded the case with direction to act upon the judgment of the single general appraiser.

In its verdict the court maintains that since there were but two small sales of the domestic color, it could not be said to have been freely offered for sale to all purchasers in the ordinary course of trade and in the usual wholesale quantities, according to the stipulation of the tariff act. Such small production and distribution of the domestic product, the court declared in effect, cannot establish real competition with the imported merchandise and so render the latter competitive.

The text of this decision is notable for its clear and exceptionally just interpretation of the appraisement clause of the dyestuff section of the tariff.

FALL COLOR CARD ISSUED

The 1926 Fall Season Color Card, issued by the Textile Color Card Association, is now being distributed to the trades. In the new card the crayon range is retained, with beiges, rosy tans and deeper greens and blues. The most important new tones are the wine and claret hues, several new blues and greens, mauve castors and coppery tones of brown and orange. A new series designated as the "Fairy Tales" are shown, comprising groups of three colors, light, medium and dark tones of one shade. They include beige tones, bluish pinks, greens, copper shades, old roses, grays and blues.

Two other outstanding colors on the new Fall Season Card are Midnight Sun, an orange, and Vassar Rose, official color of Vassar College.

The principal wine shades shown are listed under the names Old Burgundy, Spanish Raison, Wineberry, Antique Ruby and Claret Red. The new greens are: Locarno, Elfin, Ming, Eve and Paradise Greens; the new castor shades, Mauveglow, Castor and Mauve Castor, colors which lead the grayish lines. Blue will appear again, but not in the navy, which was popular during the spring. The new purples are shown in two classifications, the reddish tonalities and dull lilacs.

Autumn millinery colors, shown on a special millinery card, have been selected from the Fall Season card. On the Shoe and Leather Color Card are four new tans and browns—Rose Beige, Marsala, Stroller Tan and Hampstead Brown—in addition to Sauterne and Mauvette, popular during spring. The new gray is Plaza Gray, fall version of Opal.

Fall woolen colors are shown this season upon a separate card, known as the 1926 Fall Season Woolen Color Card.

NATIONAL ANNOUNCES THREE NEW DYES

The National Aniline & Chemical Company has placed on the market three new colors: National Solantine Blue FF, National Erie Black BF, and National Erie Blue Green CW.

The Solantine Blue FF, according to the announcement, may be used in any type of dyeing machine, owing to its solubility and level dyeing properties and its resistance to the action of metals. While particularly recommended for cotton and artificial silk, it will find extended use in dyeing mixed fabrics in which the animal fibers are to be left clear. Owing to its complete dischargeability with hydrosulphite, it is further said, perfect whites are obtained, thus making it a satisfactory ground color for the printing trade.

National Erie Black FF, an addition to National's line of direct blacks, possesses properties similar to National Erie Black GXOO, but is somewhat brighter. This new black is suitable for all classes of fabrics to which direct blacks are commonly applied, such as cotton, artificial silk, pure and tin-weighted silk and cotton and silk hosiery. It is described as soluble, level dyeing, fast to washing by aftertreatment with formaldehyde, to perspiration, hot pressing and rubbing. It is said to be particularly useful for speck dyeing on account of its property of dyeing vegetable fibers at low temperature.

The second new addition to the National direct colors, National Erie Blue Green CW, according to the announcement, should prove very useful where a straight color is wanted for dull shades of green and for general shading purposes, for which it is particularly recommended. It is suitable for union goods, dyeing cotton, wool and silk practically the same shade, while it tints acetate silk very slightly. This new green is furthermore said to possess excellent solubility to dye level and exhaust freely.

Complete technical information concerning any of these new colors may be obtained from any of the branch offices of the National Aniline & Chemical Company.

DUPONT ANNOUNCES NEW PONSOL PINK AND FAST DIRECT ORANGE

A new Ponsol color, Ponsol Pink B Double Paste, and a new direct color, known as Pontamine Diazo Orange 2R, have been developed by the Dyestuffs Department of E. I. du Pont de Nemours & Co.

Ponsol Pink B Double Paste is well known in the trade as having been used for many years to meet requirements on cotton, rayon, etc., where fastness requirements are extreme. The product is also said to be fast to chlorine, light and washing. It is bluer than this manufacturer's Sulfanthrene Pink FF and is submitted to the trade where faster requirements exist than in the case of the Sulfanthrene color.

Ponsol Pink B Double Paste is suitable for dyeing in circulating machines, is described as having excellent fastness to washing, chlorine, acid, sulphur and alkali and is therefore suited for cross-dyeing and padding. It stands bleaching with peroxide, according to the announcement, and shows good resistance to rubbing and ironing. It is suitable for printing, dyeing piece goods and as a shading color.

The new direct color, Pontamine Diazo Orange 2R, it is claimed, is one of the fastest diazo colors. When diazotized and developed with beta-naphthol, this new dye yields bright shades of reddish orange. It is said to possess very good fastness to water, washing, perspiration, acids, alkalies, cross-dyeing and light. The working properties of Pontamine Diazo Orange 2R are said to be excellent, according to the description: it dyes very levelly, exhausts well and dissolves with extreme ease, even in very high concentrations. Because of its extraordinary solubility in connection with easy penetration and good level dyeing properties, it is claimed that this color is particularly suitable for machines of the closed circulating types where solubility is one of the first requirements. Pontamine Diazo Orange 2R can be dyed on cotton goods in all stages of manufacture and is particularly recommended for dress goods, embroidery yarns and similar materials. It can also be used in dyeing silks.

TWO ADDITIONS TO INDIGOSOL COLORS

Folders issued by Durand & Huguenin S. A. and distributed by their American agents, Carbic Color & Chemical Company, Inc., describe the properties of two new Indigosol colors, known as Indigosol Pink HR Extra and Indigosol range HR, and exhibit these two colors on attractively printed swatches.

The new Indigosol Pink is described as soluble in water and of good stability. Like other Indigosols, it may be used not only for roller printing but also in block and yarn printing, as well as for application in the padding machine. The bright shades of pink produced are said to possess excellent fastneess to washing and chlorine and good fastness to light. It is best developed by the steaming process. The product is said to be well suited for resisting Hydrosulphite NF Conc. or Rongalite C and may also be applied as a resist under Aniline Black according to a process which is being patented.

The properties of Indigosol Orange HR are very similar to that of the pink. It possesses good fastness to washing and chemicking of prints, and to light, according to the announcemeent. It is also best developed by the steaming process and may be resisted to a white by means of Hydrosulphite NF conc. or Rongalite C, sodium acetate and sodium thiosulphate. The nitrite process is also well adapted for developing, using a sulphuric acid bath of 140 deg. F.

Each folder gives complete dyeing recipes for the patterns displayed.

RECENT LITERATURE

Intermediates for Dyestuffs. By A. Davison, B.Sc. A. I. C. D. 7½ x 10. Cloth. 256 pages. $11.00

This volume represents one of the few important works on dyestuff chemistry that have appeared in recent years. A fundamental problem in dye manufacture is the making of the intermediates. If they cannot be manufactured economically and of standard purity the process of converting them into the finished dyestuffs cannot be a commercial and technical success. Many excellent textbooks are available which treat of the manufacture and use of the finished colors, but these usually summarize the structure of the intermediates employed. In "Intermediates for Dyestuffs" the author devotes the entire text to a scholarly exposition of the manufacture of the intermediates, merely indicating the principal colors in the manufacture of which each important intermediate is used.

By means of cross-references it is possible to trace out the relation between the various products analyzed. The classification employed follows the structure of each intermediate through the various stages of transformation from the coal tar crude which constitutes its raw material. The part played by the intermediate in the manufacture of each class of dyestuff and its influence on the shade, fastness and solubility of the color is clearly and instructively covered. As an authoritative reference work the volume fills a space in the coal tar chemical library.

Chemistry in Agriculture—A Co-operative Work. Edited by Joseph S. Chamberlain, Professor of Agriculture and Organic Chemistry, Massachusetts Agricultural College, and C. A. Browne, Chief, Bureau of Chemistry, U. S. Department of Agriculture. Chemical Foundation, Inc. 384 pages. 48 illustrations. $1.00.

In issuing "Chemistry in Agriculture," the Chemical Foundation has produced another notable volume in its series covering the practical phases of the great profession of chemistry in a manner suited to the popular taste. The book represents more than a year of painstaking effort and is the first authentic work that ever treated in popular language of the very vital part played by chemistry in the advancement of agriculture and the whole problem of food production.

The contents, taken as a whole, endeavor to present what is known of the relation of nature's great triad, the soil, plants and animals, as discovered by the chemical researches of the last century and a quarter. The story of what has been done to make the practices of agriculture truly scientific and to provide necessary materials of that practice is told here by twenty of the foremost authorities on agricultural chemistry. Aside from its obvious interest to students of agriculture and of chemistry, the book is a fascinating story of the application of modern science, and as such should hold the interest of all who derive pleasure in acquiring knowledge of the world about us. Again we congratulate the Chemical Foundation upon its good work.

Indigosol O—Patterns Produced in Printworks. Durand & Huguenin S. A., Basle.

One of the most beautiful pattern books covering a single series of colors has been issued by Durand & Huguenin S. A., Basle, Switzerland, and is being distributed in this country by Carbic Color & Chemical Company, Inc., of New York, sole agents in the United States and Canada for the products of the Swiss concern.

The patterns, twenty-five in number, exhibit the effects obtained in printing with Indigosol O, and a more varied and brilliant array of designs it would be difficult to find between the covers of a single book. The volume contains only 41 pages, the pattern being displayed on the right hand page and the process formulas appearing on the facing page. The first six pages of text give recipes for the application of Indigosol O to resist styles, by the nitrite process and by the steaming process, the latter recipes being subdivided into white resist, color resist with nitrosamine, color resists with vat dyes and with basic dyes.

The designs often border on the grotesque, or so they would probably appear to American eyes, but in almost every case the selection and combination of the colors are strikingly original and harmonious and present a variety that gives only a slight hint of the infinite possibilities in this class of printing.

A circular inserted in the book contains supplementary information about the application of Indigosol O by the various processes mentioned, this data being better adapted to the needs of the industry in this country.

SECOND EDITION OF SRA COLOR CARD

The color card showing SRA dyes for Celanese brand yarns, fabrics and garments has been issued in a second edition by The American Cellulose and Chemical Manufacturing Co., Ltd. Twenty-seven different colors are shown, two percentages being displayed for each, together with a swatch of white cotton dyed in the same bath and left practically stainless. The shades comprise pale yellows, various tones of orange and red, a heliotrope, a violet, several blues pink, emerald, green, brown, seal and black.

The Reduction Products of Azo Dyes

Part XIV

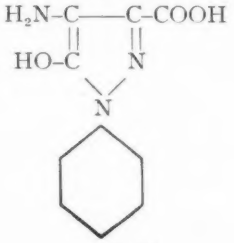
By WALTER C. HOLMES

Color Laboratory, Bureau of Chemistry

[EDITOR'S NOTE.—*The most practical and effective method for the identification of azo dyes consists in the isolation and identification of the products which they yield on reduction. This method finds less application than it might or should, partly because some of these products have never been isolated and investigated, and partly because much of the data which has been obtained in regard to such reduction products is greatly scattered aand very difficult to locate.*

Mr. Holmes has made a search for all the available information on such reduction products, and this series contains a digest o his results with a systematic listing of the reduction products of the azo dyes published in the Colour Index, together with the availabledata on suuch properties and reactions as would be of service in their identification.]

No. 160.—1-*p*-SULFOPHENYL-3-CARBOXY-4-AMINO-5-HYDROXY PYRAZOLONE



$C_{10}H_9N_3O_6S$; Mol. Wt. 299.21; (C, 40.1%; H, 3.0%; N, 14.0%; O, 32.1%; S, 10.7%).

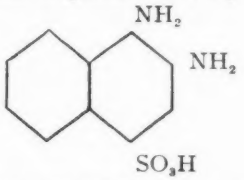
Derived from C. I. Nos. 637, 640, 644, 646 and 653.

Heavy small needles, almost insol. in cold H_2O, alc. and Ac HO. It is decomp. on heating without melting. Sols. in alkalies become colored violet in the air. A sol. of the acid also turns dark violet with conc. H_2SO_4.

Acid Na salt, small, faintly reddish cryst.

No. 161.—1, 2-DIAMINONAPHTHALENE-4-SULFONIC ACID

(Amino Naphthionic Acid)



$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

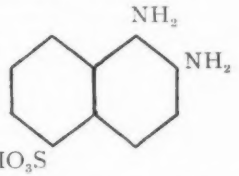
Derived from C. I. Nos. 46, 108, 347, 351, 367, 370, 373 to 376, 383, 415, 434, 448, 453, 454, 460, 461, 495, 498, 526 and 616.

Small needles, sp. sol. in H_2O. The ammon. sol. is oxidized only very slowly in air, becoming pale green-brown, turned pink by HCl. With traces of $FeCl_3$ it gives a dirty green color, quickly turning brown-black; with excess $FeCl_3$ a dull green color and on warming a grass-green color and a green pptte. On treatment with Na amalgam it yields 1, 2-naphthalenediamine.

If a boiling sol., acidified with Ac HO is treated with an equiv. sol. of phenanthraquinone in $NaHSO_3$ sol. with excess Ac NaO a quinoxaline sulfonic acid is obtained in fine lemon-yellow needles which dissolve in H_2SO_4 with a blue-violet color. Fused with KOH this gives a euhrodol dye which dissolves in H_2SO_4 with an indigo-blue color and gives at once a carmine-red cryst. pptte. on dil.

The *acetyl deriv.* (of amino naphthionic acid) is readily sol. and is converted into ethenylnaphthalene diamino sulfonic acid by mineral acids or heat.

No. 162.—1, 2-DIAMINONAPHTHALENE-5-SULFONIC ACID



$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

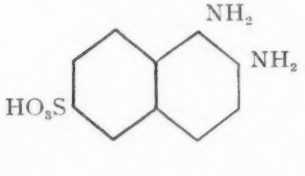
Derived from C. I. Nos. 47, 362 and 449.

Glittering brown leaflets, diffic. sol. in H_2O. Alk. sols. turn brown slowly. It gives an emerald-green color with $FeCl_3$ ano a dark green pptte. on long standing. It reduces $AgNO_3$. It gives 1, 2-naphthalene diamine by treatment with Na amalgam in presence of SO_2.

With phenanthraquinone it gives an azine dye which dissolves in H_2SO_4 with a violet color becoming orange on dilution. The corresponding euhrodol, obtained by fusion with KOH, is an orange-yellow dye, sol. in H_2SO_4 with a dark violet color which turns cherry-red on dil. and then gives a dirty red pptte.

No. 163.—1, 2-DIAMINONAPHTHALENE-6-SULFONIC ACID

(Amino Broenner Acid)



$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

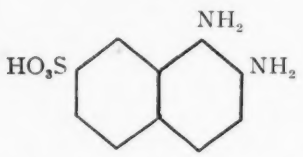
Derived from C. I. Nos. 256, 360, 361, 378, 435, 450, 451, 453, 456 and 489.

Long rectangular plates or fine pointed needles, very diffic. sol. in H_2O. An ammon. sol. on filter paper is slowly colored brown-pink which turns red and is then slowly decol. by HCl. With $FeCl_3$ it is described variously as giving a yellow color and a dirty green pptte.

With phenanthraquinone it gives a citron-yellow quinoxaline sulfonate which dissolves in H_2SO_4 with a red-violet color. Fused with KOH this yields a euhrodol which dissolves in H_2SO_4 with a pure ultramarine blue color and slowly deposits a cherry-red pptte. on dil.

The *Na salt* is pptd. by excess NaOH in silvery glittering scales.

No. 164.—1, 2-DIAMINONAPHTHALENE-7-SULFONIC ACID
(Amino-F-Acid)



$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

Derived from C. I. Nos. 361, 416, 451, 452, 455, 457 and 489.

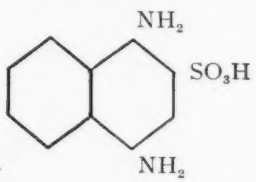
Somewhat more sol. than amino-Bronner acid but very similar in general characteristics.

Excess NaOH, however, does not pptte. a cryst.

Na salt and the euhrodol dye which may be obtained from the amino acid (see under Nos. 161 to 163) dissolves in H_2SO_4 with a violet color and gives a brown-red pptte. on dil.

Like Nos. 162 to 163 it is decomp. by HNO_2 and does not couple with diazotized bases.

No. 165.—1, 4-DIAMINONAPHTHALENE-2-SULFONIC ACID



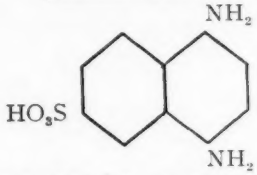
$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

Derived from C. I. Nos. 529, 530 and 580.

Colorless cryst. which turn blue-violet in air quickly. Very sp. sol. in H_2O. In alk. sols. it is oxidized by the air to a yellow cryst. product with an intense green-yellow fluorescence.

With excess HNO_2 it does not give a tetrazo deriv. but a diazo amino deriv., but the second amino grp. may be diazotized after the first has been coupled. For properties of monazo and disazo dyes derived by coupling see Friedl. *5*, 508-513.

No. 166.—1, 4-DIAMINONAPHTHALENE-6-SULFONIC ACID
(Amino. Cleve's Acid)



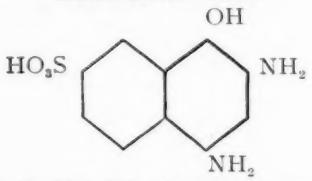
$C_{10}H_{10}N_2O_3S$; Mol. Wt. 238.21; (C, 50.4%; H, 4.2%; N, 11.8%; O, 20.2%; S, 13.5%).

Derived from C. I. Nos. 271, 288, 290, 297, 298, 303, 316, 317, 318, 320, 496, 532, 533, 534, 537, 539, 541 and 618.

Silvery needles or cryst. pdr. The acid is very sp. sol. in H_2O but its salts with alkalies and alkaline earths are readily sol. With HNO_2 or $FeCl_3$ it gives naphthoquinone.

Mono acetyl deriv., small colorless needles, is also very sp. sol. in H_2O but gives soluble salts with alkalies and alkaline earths. With $FeCl_3$ it gives a brilliant blue color turning brown on long standing or heating. It may be diazotized without decomp., yielding a yellow sp. sol. diazo comp. It may be converted into 1, 4-naphthalene-diamine and into 1-naphthylamine-7-sulfonic acid.

No. 167.—2, 4-DIAMINO-1-NAPHTHOL-7-SULFONIC ACID



$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

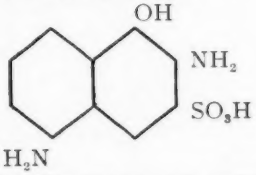
Derived from C. I. No. 10.

The hydrochloride cryst. in long rhombic plates which turn reddish in air quickly. Mod. sol. in H_2O but insol. in alc. With $FeCl_3$ it gives a pptte. of the diiminonaphthol sulfonic acid, copper-red micr. needles, insol. in cold H_2O and sol. in hot H_2O with partial decomp. In alkalies it dissolves with a yellow color and is then pptted. by acids.

It gives a triacetyl deriv. of which the Ba salt ($+3\frac{1}{2}H_2O$) forms long white star-grouped cryst. diffic. sol. in H_2O. With $FeCl_3$ the sol. turns brown and is then quickly decol. with a deposit of yellow cryst.

The diaminonaphthol sulfonic acid forms a tin salt which cryst. in leaflets and is stable in dry condition but readily oxidized by the air if moist. The acid gives no dyes with diazo comps. and is decomp. by HNO_2.

No. 168.—2, 5-DIAMINO-1-NAPHTHOL-3-SULFONIC ACID

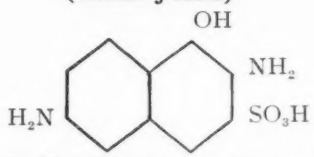


$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 424 and 515.

Apparently no data are available.

No. 169.—2, 6-DIAMINO-1-NAPHTHOL-3-SULFONIC ACID (Amino-J-Acid)



$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 393, 425, 471, 533, 537 and 543.

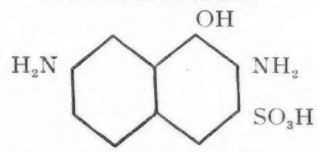
Sp. sol. in H_2O. Hot aq. sols. have a blue fluorescence and dil. alk. sols. a bright green fluorescence.

An ammon. sol. on filter paper turns green-yellow, soon turning brown and give a green spot with HCl which almost immediately becomes pink with a green rim. If $FeCl_3$ sol. is added to a very dil. aq. suspension of the acid it gives a dull green color which quickly turns dull violet, then blue-red and finally brown-red.

In aq. suspension the acid can be diazotized and coupled with β-naphthol.

The triacetyl deriv. of the unsulfonate diaminophenol melts at 261° (decomp.).

No. 170.—2, 7-DIAMINO-1-NAPHTHOL-3-SULFONIC ACID

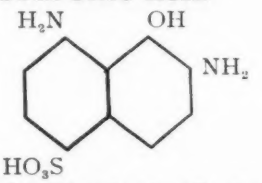


$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 205, 267, 268, 297, 317, 345, 395, 396, 398, 399, 401, 404, 420, 483, 485, 492, 493, 514, 521, 532, 538, 539, 540, 544, 545, 547, 551, 553, 555, 560, 562, 572 (580), 591, 592 and 617.

Small yellowish cryst. or clear brownish leaflets (from Ac NaO sol.). Nearly insol. in cold H_2O and only sl. sol. in hot H_2O. It dissolves readily in alkalies and alk. sols. are readily oxidized in air. An ammon. sol. on filter paper rapidly turns brown and gives a dull violet spot with conc. HCl. With $FeCl_3$ it gives a blue color (or a green color rapidly turning violet) and with bleaching pdr. sol. a Bordeaux-red color. With HNO_2 it gives a yellow-brown (or deep brown) sol. with evolution of nitrogen.

No. 171.—2, 8-DIAMINO-1-NAPHTHOL-5-SULFONIC ACID

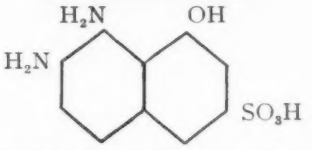


$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 391, 392, 405, 470, 473, 474, 476, 513 to 517 and 519.

Reported as suitable for application as a photographic developer. Apparently no data are available. The triacetyl deriv. of the unsulfonated aminophenol melts at 234°.

No. 172.—7, 8-DIAMINO-1-NAPHTHOL-3-SULFONIC ACID

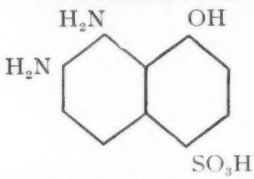


$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 353, 353A, 394, 400, 408 and 419.

Sp. sol. in H_2O. Heated with an aq. suspension of phenanthrenequinone it yields a cryst. phenanthronaphthazine dye, very sl. sol. in cold H_2O, more readily sol. in hot H_2O with a yellow color and also sol. in hot alkalies. It dyes wool yellow and dissolves in H_2SO_4 with a green-blue color.

No. 173.—7, 8-DIAMINO-1-NAPHTHOL-4-SULFONIC ACID



$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. No. 242.

It gives a phenanthronaphthazine dye by condensation with phenanthrenequinone which is sp. sol. in hot as well as cold H_2O but is mod. sol. in cold dil. alkalies and readily sol. in hot alk. sols. It dyes wool yellow and dissolves in H_2SO_4 with a blue color.

CHLORANTINE FAST BLUE 4GL

The qualities of Chlorantine Fast Blue 4GL are described in a circular recently issued by Ciba Company, Inc. The color tone of this product lies between Chlorantine Fast Blue GL and 2GL. Its brightness is said to be its distinguishing characteristic. It is best adapted for the dyeing of cotton and rayon and also meets the needs of unweighted silk for dyeing with a weak acidifying bath. The silk remains pure white in an alkaline soap bath, so that Chlorantine Fast Blue 4GL can find application in the dyeing of half silk goods, in which the silk can afterward be dyed with acid colors. It is dischargeable to a pure white. This Ciba color is also recommended for the printing of fast to light dischargeable goods, according to the announcement.

In an address before the recent annual meeting of the British Cotton and Wool Dyers' Association in Manchester, Adolph Hoegger, presiding, stated that wages in the dyeing trades were still about 118 per cent above those of 1914. In order to maintain such a schedule, he said, it must be realized that it could only be done if production was kept at standard in quantity and quality.

Technical Notes from Foreign Sources

Resist Dyeing

A resist for use in the dyeing and printing of yarn or textile material comprises glue, gum arabic, and a vegetable or cereal flour, and is preferably prepared by mixing glue and the gum, adding sufficient water to soften the glue, heating on a water bath and finally stirring in the flour to form a stiff paste. The resist may be applied in the usual manner to parts of a fabric which is subsequently dyed or printed with a color.

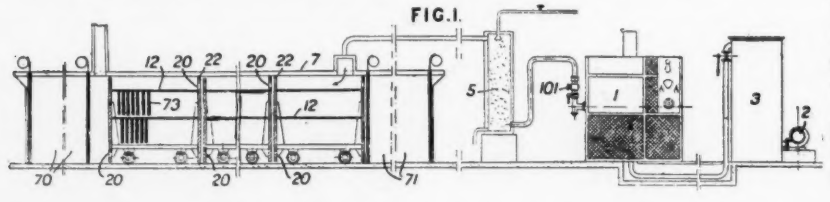
In dyeing hanks the resist may be applied by soaking a string therein and tying this around the hank where the two colors are to meet, or a tape or thick string may be dipped in the resist and wound around the part to be isolated from the coloring matter, the tape after dyeing being removed and if required a second impregnated tape wound around the colored parts while the uncolored parts are dyed a different color. A color may, if desired, be incorporated with the resist so as to color the parts of the yarns or fabrics treated therewith. (British Patent No. 247,757.)

Bleaching Fibers

After putting the fibers through a preliminary treatment with an acid, the fibers are bleached with the aid of a mixture of ozonized air and water vapor. The apparatus in which this operation is carried out is shown in the accompanying illustration.

The air is drawn in by a fan (2) and is dried in a tower (3). It is then ozonized in an apparatus (1) and is passed through a meter (101) and a coke washer (5). A water spray is supplied from a valved conduit to a bleaching tunnel (7). A certain amount of water vapor is therefore drawn through the apparatus. Skeins (73) of fibers to be bleached are carried on rails (12) on trucks (22) which are propelled mechanically or by gravity through the tunnel. The rails may be rotated to present all the area of the fibers to the action of the ozone. The ends of the trucks are provided with flaps, which engage the interior of the tunnel, and with staggered holes (20) for the purpose of ensuring circulation of the ozone. End chambers (70 and 71) may be provided to permit continuous operation or alternatively two adjacent tunnels may be employed having a common ozone supply passage. The ozone is then admitted to each tunnel alternately. (British Patent No. 247,738.)

FIG. 1.



Suphonated Wool Fat

The waxy and the liquid fractions that are obtained from wool fat are sulphonated separated. The hard fat is obtained by cooling a saturated solution of wool fat in acetone or benzine, and the soft fat is then obtained by fractionation with alkalies and organic solvents. (British Patent No. 247,714.)

Storing Color Liquors and Primary Liquors in Indanthrene Dyeing

Those who peruse the directions for the solution and the dyeing with the aid of Indanthrene colors will find nothing mentioned there about the storing of the primary color solution for a comparatively long time. It is a fact that it is advantageous to be able to store the primary bath in carrying out operation on a practical scale, and this has not been done at the present time. The pulverized material, when it is protected from moisture, will remain stable on storing, and will always give the same depth of color when employed in the same definite proportion. It may be that one or another of the Indanthrene colors will give a color liquor which will remain stable for a short time, but the average Indanthrene color does not behave in this way.

We will consider the case of an Indanthrene dye which is soluble in cold water at a temperature of 30 to 45 deg. Cent. When this color liquor, even when the flask in which it is kept is closed, is allowed to become cold and stand for a short time, the color is precipitated in flake form or in the form of granules or even in the form of crystals. In general, the primary vat is often opened and in this way a certain amount of air is allowed to penetrate into it, so that the surface of the liquor is being constantly oxidized. Thus hydrosulphite is used up. When this happens and it is desired to make up a proper primary liquor once again, it is necessary to add lye and hydrosulphite while heating the mixture up to a temperature of 30 to 40 deg. Cent. But it is very doubtful then that the original strength of the color liquor is attained. But it must be remembered that the constant strength of the primary color liquor is important in determining whether or not the same depth of color is going to be obtained on the dyed goods. It is a fact when the primary liquor is brought back again up to the original concentration of hydrosulphite,

that it will contain too much lye and this has a very bad effect in the way in which the color is absorbed by the textile fiber.

When the Indanthrene vat color is employed at a temperature between 45 and 50 deg. Cent. then the same phenomena take place as in the case of the cold dyeing process. Then the consumption of lye and hydrosulphite is the same. In the case of the Indanthrene color which is dyed in the warm state as well as in the case of those colors which are dyed in a hot bath and which require considerably more lye, a primary liquor is unnecessary, as the pulverized substance can be dissolved without any difficulty in the final dye liquor with the added soda lye and hydrosulphite. Those dyers who are well acquainted with the Indanthrene colors know also that some of these products can be easily dyed when certain precautions are followed, and in the case of others, when the liquor precipitates there is no way in which this condition can be corrected. By far and large, however, the preparation of the dye liquor, in the way in which an Indigo liquor is prepared, is not only impossible but it introduces errors in the dyeing process which are of consequence.

Sizing Fabrics

British Patent No. 247,427 is concerned with a process and apparatus for the impregnation of fabrics in long lengths. The apparatus in which this process is carried out is shown in the accompanying illustration.

Superposed coacting quetch rolls for sizing fabric are rotated by a variable speed drive which allows of exact adjustment of the peripheral speed of the quetch rolls to that of the drying rolls which draw the fabric forward. The fabric is drawn from a beam 17 on a carriage movable transversely on the machine, passed between the rolls 22, 23, or between rolls 23 and 24, then around three drying drums and is finally wound onto a beam (3), which is also movable transversely on the machine.

The roll (22) dips into the sizing liquor in a trough 44, carried by rods 45 vertically adjusted by means of links 47 and 48. The drying rolls are driven by spur gearing from a sleeve on a shaft h, the rolls (22, 23, 24) from the nearest drying drum by spur gearing, and a belt (41) passing around the coned pulleys (39, 36) and the beam (3) by a belt 11 which connects pulleys on shafts h and 6. A spur wheel (32), Fig. 4, on the shaft of the pulley (36) can be engaged directly with a spur wheel (28) on the shaft of the roll (22) or indirectly by means of a pinion (35), according as it is desired to pass the fabric between the two upper rolls (23 and 24) or the two lower rolls (22 and 23). The belt 11 is provided with an adjustable tensioning roller (16).

Dyeing Process

The dyeing process which is patented in French Patent No. 576,062, depends on the action of nitrites for the development of autogenous colors on animal and vegetable fibers which have been mordanted with tannin. The process may be used to obtain a series of multiple color effects with the ice colors and also the basic matters, while employing tannin as a mordant.

Animal fibers of all sorts dye in the cold in acid liquors which contain alkaline nitrites and metallic salts, and the tannins are fixed on the fiber, giving rise to colors which may be used as basic or ground colors for the development of basic colors.

For example, the bath contains 20 liters of water, 10 to 40 grams of nitrite of soda and 10 to 40 grams of copper sulphate. A stay of twenty hours in this bath will produce an old rose effect on silken fibers. The colors become more marked when a little acetic acid is added to the color liquor.

Oxidation and Mercerization

A series of investigations are described in the Journal of the Society of Dyers and Colorists, 1926, Volume 42, pages 45-53, which were made to determine the effects of oxidation on the cotton fiber before and after mercerization.

FIG.1.

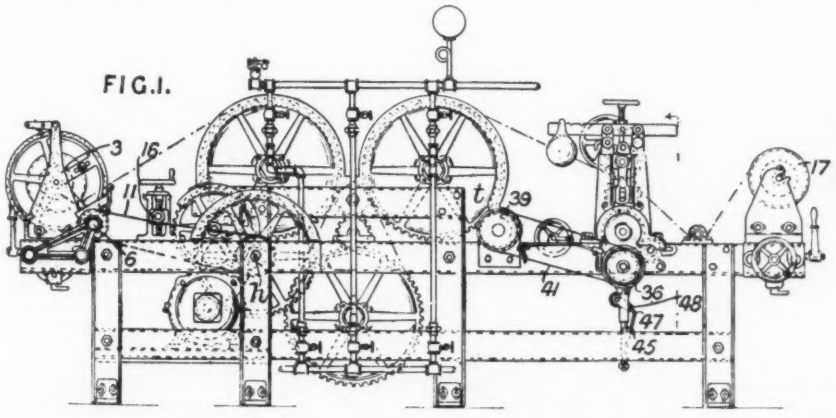


FIG.3.

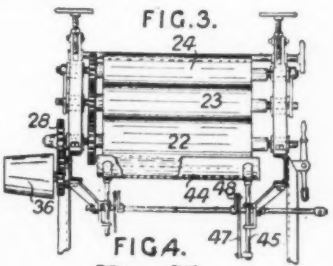
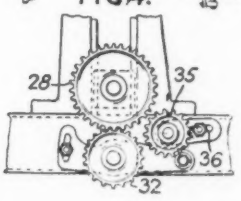


FIG.4.



The tests were made on American cotton 2/50's, and the oxidation was obtained with the aid of potassium permanganate and bleaching powder. Mercerization was obtained with the aid of a solution of sodium hydroxide of 1.25 density, and nitric acid of 1.415 density without tension. Cotton yarn which has been mercerized with sodium hydrodide shrinks less, becomes weaker and has a smaller copper number and less affinity for dyestuffs than yarn which has been mercerized with the aid of nitric acid. Mercerized cotton is more susceptible to oxidation and deterioration by exposure to heat and light than ordinary cotton, the yarn mercerized with sodium hydroxide being more susceptible. Cotton yarns mercerized by caustic soda and nitric acid after either a moderate or high degree of oxidation suffer a decrease and a slight increase in textile strength respectively, but while the nitric acid increases the copper number of the oxidized yarn slightly, the caustic soda decreases the copper number considerably.

Yarns which have been weakened by oxidation suffer less than their usual shrinkage when mercerized with nitric acid. Cotton yaarns mercerized by means of various strengths of sodium hydroxide and then oxidized have copper numbers which decrease as the strength of the mercerizing liquor decreases. Approximately equal rises of temperature occur during the mercerization of cotton with sodium hydroxide and nitric acid under similar conditions. The affinity of mercerized cotton for oxygen and for moisture varies with the degree of the mercerization. The drying of mercerized yarn decreases its susceptibility to oxidation, but mercerized cotton maintained moist by physical means shows no increased affinity for oxygen.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XX

Special One-side Padder—Its Construction, Operation and Advantages

By RAFFAELE SANSONE

WHEN conducting back or front topping effects on many of the ordinary padding machines, even if these are of the most perfected construction, a certain quantity of bath is always left in the trough placed below the squeezing rollers, and when the treatment of the goods is finished has to be thrown away, unless by some chance it can be added to the next lot. Besides this, it is often necessary to introduce a certain quantity of thickening in the bath to cause a better adherence to the lower pressure bowl.

To avoid such inconveniences, which in the course of a day's work can represent considerable expense, a plant constructed on the principle shown in Fig. 1 would offer marked advantages.

This consists of a strong rectangular cast-iron table (Q) fitted firmly with bottom plates to the flooring of the dyehouse and surmounted by the light iron stands m and n, joined to the double frame sides F. Stand n is supplied with three tension bars (a, b, c) that also smooth the cotton cloth (M) as it rises from a wooden beam (E), kept in position on small supports, remaining continually under the action of spring brakes; while the stand m has a single wooden bar (r), over which the cotton cloth runs after passing through pressure bowls A and B.

Frame sides F are of specially strong construction and contain in the center a long narrow opening with steel slides, in which are entered ball bearings supporting two heavy-pressure bowls (A and B). The lower bearings rest on the lower portion of the slides, while the upper are kept in position elastically by pressure irons, entering for a certain depth in the interior of frames F and kept continually under the action of springs. The upper pressure bowl is of copper-plated iron, while the lower is of iron covered with India rubber.

A much smaller iron India-rubber-covered roller (J) is supplied, which can be moved forward against bowl B or withdrawn from it in a straight line by a hand screw (U) turning in a strong steel guide (f). Against bowl A is another similar small squeezing cylinder (i) of copper-plated iron. This is moved backward and forward in a guide (e) through turning the hand screw T.

Pressure Bowl B has throughout its round surface a

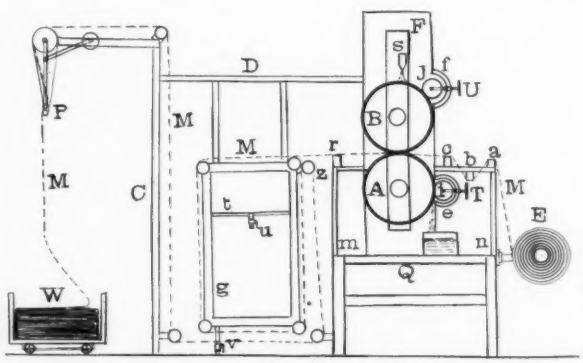


FIG. 1

very shallow continuous incision of length slightly above that of the broadest piece to be topped and serving to collect just what dye bath is necessary to wet slightly the surface of the material that has been bottomed in the direct colors. The machine has several separate bowls of equal diameter to the above, but with an incision of smaller or larger depth, such bowls being substituted for the above in accordance with the intensity of the topping to be conducted. Bowl A, as already indicated, is of iron covered with India rubber and is of uniform height throughout its round surface.

Above the upper pressure bowl (B), and so as to remain enclosed in the opening of frame sides F, is placed a copper spraying tube (s) that distributes a carefully regulated quantity of basic dyestuff solution into its engraving, all excess of the latter being kept back by the small cylinder J and delivered to two side channels at the extremities of bowl B corresponding with channels of equal size on bowl A. The lower cylinder (i) causes the said excess of bath to fall into a small collection trough placed on table Q.

At the back of frame sides F and table Q is placed a special drying mechanism (g), fixed to upper horizontal bars (D) by iron bands. On this the topped cotton cloth is rapidly dried by rubbing continually the untreated portion against four flat heated surfaces, the treated side only coming in contact with a guide roller (z) at the end of the same. From here the cloth passes on other guide rollers and is carried to the lifting arrangement C and to the plaiter P, which forms it into pieces in a small truck (W).

The drying disposition comprises in this instance a hollow rectangular iron frame (g), where steam is introduced from two sides by tube t and tap u. All condense water accumulated at the bottom of frame g is eliminated by tap v and a steam trap not to be seen in the figure.

Frame g has its corners so constructed that they can contain a small copper-plated iron guide roller revolving in ball bearings that are so encased that the cloth passing on them is obliged to rub continually on the flat surfaces exposed below.

The driving of the plant is provided for by leather belting or other convenient means from an upper transmission, it being possible to drive the machine at a speed that can be regulated in each case through the employment of extensible pulleys or special worm gearing.

The Operation of the Plant

For working the above plant a long cotton tape is first run through, passing through the nip of bowls A and B, on drying mechanism g, on the lifting arrangement C and through plaiter P, and sewed to the beginning of the first piece of cotton cloth that has been bottomed with direct colors and requires topping.

After the above preparatory operations, the volume of dye bath required for the treatment of the whole batch of material is prepared in a vat of suitable size at the back of the plant, supplied with a steam-heating coil, a cold-water cooling coil and a mechanical agitator. A portion of the cold dye bath is then entered in an upper trough at the back of the frame sides (F), a tap below this is opened to let it run slowly to sprayer (s), and the plant is started.

In this way the dye bath passes slowly on the upper bowl B, and by means of the small India rubber roller J the engraving on the latter is continually filled with fresh topping bath, which at first meets the cotton tape and colors it somewhat. In the meanwhile the operatives have not lost time, for while the cotton cloth is being pulled slowly through the tension bars a, b, c they spread it out uniformly, and in this way it comes at once in contact with the dye bath, which is, however, only deposited on one side.

On passing forward beyond the point of juncture of bowls A and B, the topped material comes at once in contact with the hot surface of the drying apparatus (g) and is uniformly dried, passing from here to lifting arrangement C and to plaiter P to be folded in piece form, ready for transporting to the finishing plant.

In the meanwhile the operatives take care that the trough distributing the bath is always kept well filled to maintain the pressure in the sprayer tube always the same, collecting from time to time the liquid in the trough below bowl A and adding it to that being employed for the topping operations. If everything is well regulated, very little overflow should, however, take place in the trough, and only sufficient bath for the topping operations should be prepared, leaving over about a quart or two when the treatment of the batch of material has been completed.

As the contents of one wooden beam come near the end, two operatives sew on the beginning of another lot of material, replacing the empty beam with this; and as one truck of material is filled it is rapidly substituted by another that has been emptied, the filled truck being pushed off to the finishing department.

From time to time the working of the steam trap at the bottom of the drying frame g is controlled to make certain that all condense water is being eliminated. Through a contact thermometer the temperature of the heated metallic surfaces on which the cloth is exposed is taken from time to time, steam being turned on if this has not reached at least 100 deg. Cent.

To avoid the danger of splitting the cloth through too much tension, or of causing it to turn over, forming folds, two springs are allowed to react on the bearings supporting guide roller z. While the cloth is run through the nip of bowls A and B, a portion of the coloring bath surpasses its borders and is in part carried upward on bowl B to be mixed with other dye bath, and in part carried downward on the India rubber surface of bowl A to be delivered to the collection trough just below.

Advantages of the Plant

The above plant has the following advantages:

1. The material can be treated very rapidly, as the dis-

tribution of the topping bath is very effective and nothing hinders its penetration where it deposits.

2. The drying of the topped cloth is accomplished without running the danger of coloring in any way the untreated portion of the cloth, granting that this is, of course, of sufficient thickness.

3. Through the possibility of changing bowl B with other bowls having a different thickness or depth of engraving, it is possible to increase or to reduce the height of the layer of topping color deposited on the material bottomed in the direct dyestuffs, achieving a stronger or weaker brightening.

4. If the cloth is sufficiently thin, one passage through the plant will top it evenly all through.

5. The consumption of topping bath is quite limited, and no thickening is needed.

6. The labor, steam, power and space required are quite small in comparison with the rate of production achieved.

7. Bowl B can be supplied, if necessary, with engravings for forming stripes or lines of equal or different thicknesses, etc.

(Part XXI will appear in an early issue.)

SOCIETY OF CHEMICAL INDUSTRY REPORTS PROFIT IN 1925

The annual report of the Society of Chemical Industry in Basle shows a net profit for the year 1925 of 3,252,354 francs, as compared with 3,196,451 francs in 1924. A dividend of 15 per cent has been declared upon the share capital of the concern of 20,000,000 francs. What profit has been made is attributed to the policy adopted a year or two ago of drastic reorganization of both the technical and commercial divisions of the business. The directorate report that great difficulties were experienced during the year in the export trade of the company. Acute competition in synthetic indigo and political unrest in the Far Eastern markets have had some effect upon this trade.

In the report of the Chemische Fabrik vorm. Sandoz. is shown a net profit for the year of 3,020,000 francs (3,300,000 francs in 1924). It is stated by the directors that the steady fall in dyestuffs prices is proving difficult to counteract by corresponding increases in sales. Export trade has shown no improvement over 1924, and reductions have had to be made in the number of workpeople and those employed on the staff. A dividend of 25 per cent has been declared on the capital of 7,500,000 francs. The reserve fund of the Sandoz concern stands at 2,005,000 francs.

There has been no change in the condition of the Swiss dyestuff industry during the past three months, according to Vice-Consul C. W. Allen, Basle. The effect of the recent consolidation of the German dye group cannot at this time be estimated. The Spanish decree restricting the importation of dyestuffs has of course been felt by the local exporters. Business during the past quarter has been normal, but had a tendency to become sluggish. The exports to the United States for the first quarter of 1926 amounted to $418,325, a decrease of $52,033 from $470,358, the total for the corresponding period of 1925.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

TEXTILE CHEMIST

Textile chemist desires responsible position. Has had fifteen years' experience in cotton yarn and cloth bleaching, dyeing and finishing plants. Wide knowledge of new artificial silk processing and fast color work, including vats and aniline black. Excellent references. Box 338, American Dyestuff Reporter.

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Practical dyer of union and all wool; thirty years' experience, also laboratory experience; desires position as overseer of dyeing. References gladly furnished. Address box 342, American Dyestuff Reporter.

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Experienced colorist; seven years' experience in matching and testing dyestuffs on all textile fibers and paper. Address Box 343, American Dyestuff Reporter.

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Proved

Monel Metal cuts cleaning costs 25%

Columbia Silk Dyeing Co.

1726-30 NORTH HOWARD STREET

Philadelphia, January 15, 1926.

The International Nickel Company
67 Wall Street,
N.Y.C., N. Y.

Gentlemen:-

We are pleased to state that several years ago we had taken out our copper lined kettles and relined them with Monel Metal, this work being done by the "LIBERTY COPPERSMITHING CO., 1708 North Howard Street, Philadelphia, Penna.

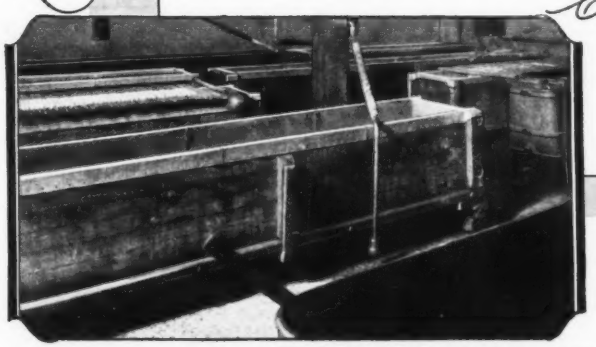
This naturally was an expense for us at first, but it has more than paid for itself. We formerly had considerable trouble in getting certain shades level when using the copper kettles but this has been entirely eliminated by using Monel Metal. Another advantage is that our production has increased considerably, and the time consumed in cleaning kettles has been saved to the amount of 25%.

These kettles have helped us out wonderfully on our Indanthrene colors; in fact our entire plant is equipped with Monel Metal and we are now able to work with ease, because it has taken a great deal of worriment off the dyer in regards to the mixing of his shades, as before when we had trouble we attributed it to the certain dyes, but since using Monel Metal we have found a vast difference in this.

We were rather skeptical at first on the attributes of the Monel Metal kettles but we are more than satisfied and we are pleased to say that they have proven more to us than we expected.

Respectfully yours,
Columbia Silk Dyeing Company.
per- Camill. Peter.

C.P./A.M.



Dye house of Columbia Silk Dyeing Co., Philadelphia, Pa. showing solid Monel Metal dye kettles, and Monel Metal-lined wood kettles. Work done by
LIBERTY COPPERSMITHING CO.
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THE INTERNATIONAL NICKEL COMPANY
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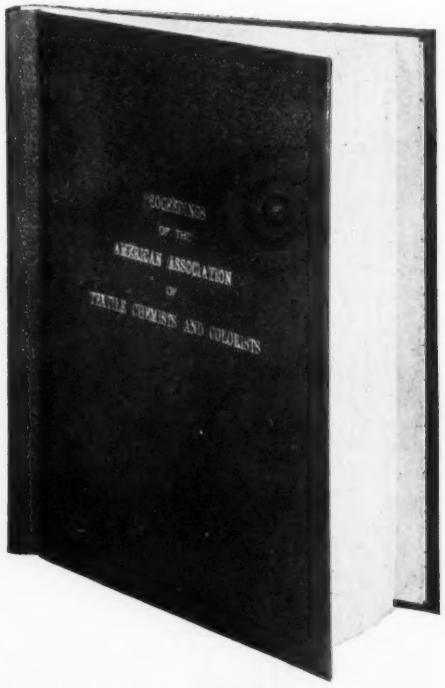

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November 1st to 6th Inclusive, 1926

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Attractive displays will be made of textile machinery, equipment, accessories and supplies. The latest inventions and improvements will be shown.

An important feature will be the Men's Club Room in the balcony for executives, superintendents, overseers and other visitors. Capable committees, well trained by six previous successful expositions, will handle the entertainment and other items on the program, in which all Greenville citizens will participate.

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Geigy Co., Inc.	—
Hussong Dyeing Machine Co.	XI
Innis, Speiden & Co.	—
International Nickel Co.	XIII
International Salt Co.	V
Jennings & Co.	IX
Kali Manufacturing Co.	VI
Klipstein, A., & Co.	Back Cover
Lewis, John D.	IV
Malt-Diastase Co.	—
National Aniline & Chemical Co.	XII
Neversink Dyeing Co., Inc.	—
Newport Chemical Works	Front Cover
New York Color & Chemical Co.	X
Oakley Chemical Co.	—
Onyx Oil & Chemical Co.	VI
Pennsylvania Dye & Bleach Works	—
Permutit Co.	IV
Roessler & Hasslacher	—
Rohm & Haas Co.	VII
Sandoz Chemical Co.	X
Society of Dyers and Colourists	Third Cover
Solvay Process Co.	—
Southern Textile Exposition	XV
Suter, Alfred	—
Textile Finishing Machinery Co.	Second Cover
Tolhurst Machine Works	XI
Union Color & Chemical Co.	VIII
United Chemical Products, Inc.	VII
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Vellner, Eugene	—
Wolf, Jacques, & Co.	IX

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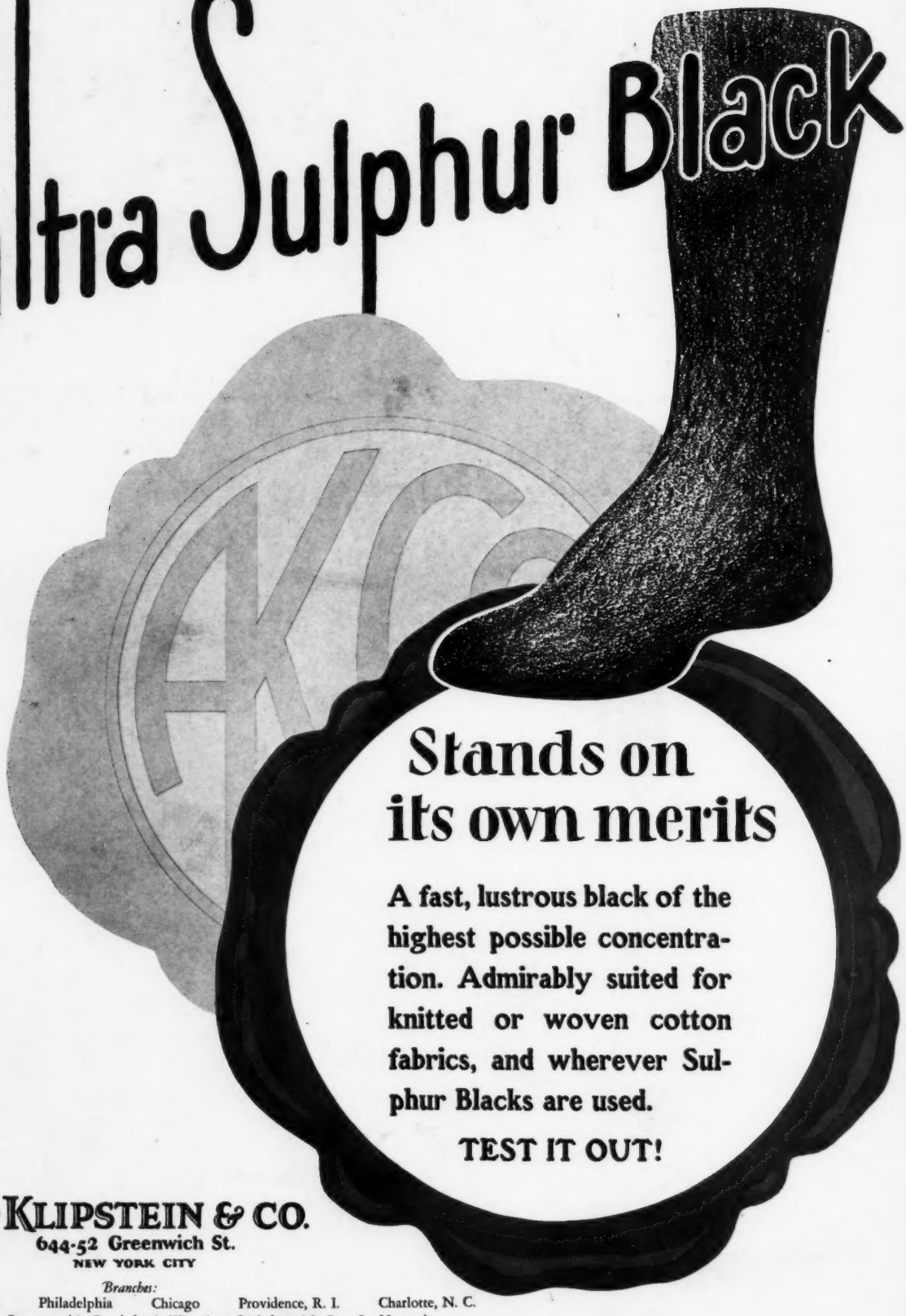

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SAMPLE SWATCH QUARTERLY

JUNE 28, 1926

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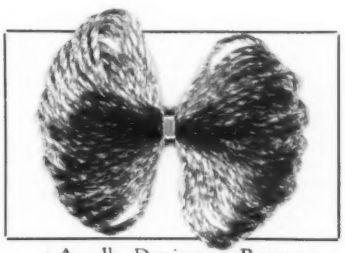

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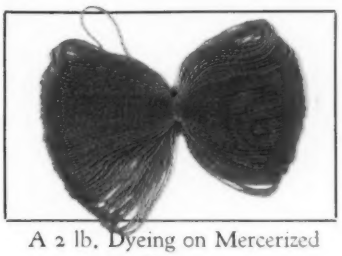
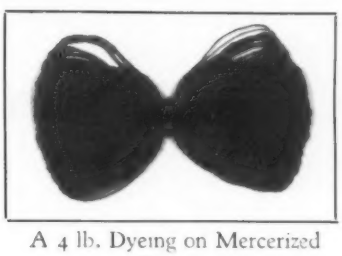


A 2 lb. Dyeing on Mercerized Cotton



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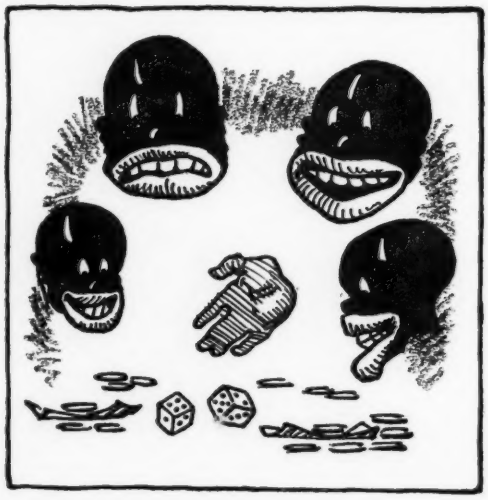

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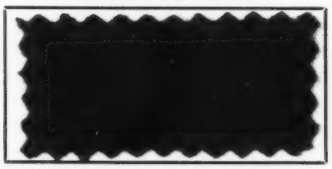

0.80% National Fast Wool Yellow 3 GL
1.30% National Alizarine Sapphire SE

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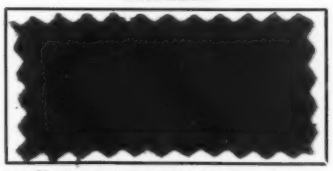

0.17% National Fast Wool Yellow 3 GL
0.19% National Wool Orange 2 G Crystals
0.24% National Alizarine Sapphire SE
0.13% National Fast Wool Red GL

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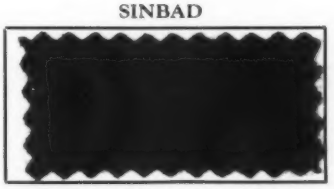

1.800% National Alizarine Sapphire SE
0.252% National Wool Orange 2 G Crystals
0.054% National Fast Wool Red GL
0.090% National Fast Wool Yellow 3 GL

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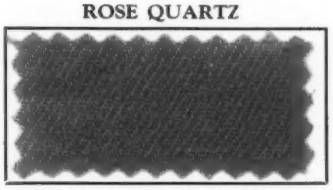

0.042% National Fast Wool Yellow 3 GL
0.070% National Fast Wool Red GL
0.054% National Alizarine Sapphire SE

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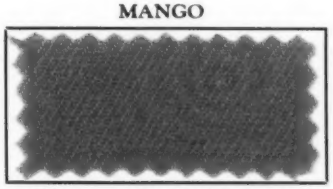
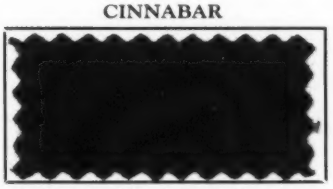


0.038% National Fast Wool Yellow 3 GL
0.210% National Wool Orange 2G Crystals
0.024% National Alizarine Sapphire SE
0.040% National Fast Wool Red GL

CHATEAU GREY

0.032% National Fast Wool Yellow 3 GL
0.068% National Alizarine Sapphire SE
0.038% National Fast Wool Red GL
0.010% National Wool Orange 2 G Crystals

CINNABAR



0.26% National Fast Wool Yellow 3 GL
1.20% National Wool Orange 2 G Crystals
0.34% National Alizarine Sapphire SE
1.74% National Fast Wool Red GL

FOREST GREEN

2.00% National Fast Wool Yellow 3 GL
0.24% National Fast Wool Red GL
3.40% National Alizarine Sapphire SE

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0.406% National Alizarine Sapphire SE
0.610% National Fast Wool Red GL

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A.D.R. June 28, 1926

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Contents of This Issue

June 28, 1926

The Proteins in General and Wool in Particular 413
Charles E. Mullin

Batik 419
Peter Mijer

Temperature, or the Influence of Heat on Washing and Sanitation 422
F. H. Guernsey

Foreign Dyes Imported Through New York and Other Ports During May..... 425

Editorials:

The Textile Institute Idea and Research.. 429

Turning Summer Dullness to Profits.... 429

Professor Olney Honored..... 430

The Dyer's School of Experience: Adventures in Chiffon Dyeing..... 431
Noel D. White

Lowell Textile School Graduation..... 433

Fastness of Colored Textiles Will Be Studied at Bureau of Standards..... 434

The Reduction Products of Azo Dyes—Part XV 436
Walter C. Holmes

Practical Hints on the Production of Bright Colors on Textile Fabrics—Part XXI.. 439
Raffaele Sansone

Technical Notes from Foreign Sources.... 441

Recent Patents 443

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SRA* Golden Orange III (New)
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SRA* Heliotrope I

SRA* Violet II

SRA* Blue III

SRA* Blue IV

SRA* Black IV

SRA* Black IV HY Special (New)
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SRA Orange III
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NEW YORK, JUNE 28, 1926

The Proteins in General and Wool in Particular

The Living Cell and Its Relation to the Proteins—The Classification and Constitution of the Proteins, With Particular Reference to Keratin

By CHAS. E. MULLIN, M.Sc., F.A.I.C.

Consulting Chemist, Camden, N. J.

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UNTIL within recent years the proteins were not quite so well understood as some of the less complex organic compounds, and even yet there are many points for discussion in regard to their constitution and reactions. In the college, or in fact any other laboratory, they are inclined to yield a "gluey mess" during most experiments, and hence are usually avoided by the student whenever possible. The fact that there are a great number of closely related proteins, all highly complex in structure and constitution, does not tend to increase their popularity with the usual student or industrial research worker. Perhaps this is the reason that they have been more or less neglected by many chemists, even textile chemists, who are in position to utilize a better knowledge of the proteins (wool and silk) than many other industries.

In order that the reader may have a better idea of the author's viewpoint upon the subject of the proteins in general and wool in particular, it may be well to review this subject in a general way at the start. This is partly done in a spirit of "self defense," as undoubtedly many readers will have their own more or less divergent views upon the subject. The writer would be glad to hear some of the experiences supporting these opinions from any who may care to write him.

The proteins are nitrogenous organic compounds of high molecular weight consisting in the main of combinations of *a*-amino acids or their derivatives. They are widely distributed in nature in living matter, or associated with it, and in the past were always produced by it. They are an essential constituent of all living cells, both animal and vegetable, and form the principal constituent of many of the body fluids, constitute the organic basis of all animal tissue, and occupy a very important position among our organic foodstuffs.

The Living Cell

Living organisms were defined by Loeb in "The Dynamics of Living Matter," as chemical machines consisting essentially of colloidal material capable of growing and automatically reproducing themselves. All living matter consists of cells, which hold the same relation to the living organism as the molecule does to inanimate matter, either organic or inorganic; that is, when we destroy the cell we destroy life, in exactly the same manner as we destroy the compound of inanimate matter when we break up the molecule.

Water, of course, forms the principal constituent, 70 to 90 per cent of all living matter (cells), and it also contains small proportions of inorganic matter, usually considered in combination. All cells also contain protein, and certain cells consist principally of proteins. The proteins constitute about 19 per cent of muscle and a very large proportion of all reproductive cells, such as eggs, etc. It is not surprising, then, that most of the important research which has been done upon the proteins has been done by workers in the field of biological research.

The functions of the living cell are entirely dependent upon the colloidal character of its constituents and practically all of the reaction processes within the body are colloidal in character, so that in colloidal phenomena again we may look to physiological chemistry for most of the advances which may be applied to industrial theory and practice. The proteins contain carbon, hydrogen, nitrogen, oxygen, and generally, but not always, some sulphur,

and sometimes phosphorus. The proportions of these constituents are approximately: Carbon, 50; hydrogen, 7; oxygen, 25; sulphur, 0 to 3, and phosphorus 0 to 3 per cent. Most proteins contain between 15.5 and 18 per cent of nitrogen. On the assumption that the average protein contains 16 per cent of nitrogen, this figure is frequently used in calculating analytical results.

All proteins have colloidal properties and some are almost insoluble in water. They give certain color and precipitating reactions, and are chemically amphoteric. They may be decomposed either by hydrolysis or oxidation, but in textile work the hydrolysis is by far the most important. The decomposition of wool and silk by oxidation usually occurs only in certain oxidizing bleaching reactions, while the hydrolysis occurs in every wet process of the textile industry no matter what its nature. The proteins are hydrolyzed by various proteolytic enzymes and micro-organisms, and by water as well as acid and alkaline solutions, yielding proteoses, peptones, peptides and amino acids, which in turn yield ammonia, hydrogen sulphide and carbon dioxide. As wool consists entirely of the five chemical elements, carbon, hydrogen, oxygen, nitrogen and sulphur, of course these elements and their less complex compounds, as suggested above, are the ultimate decomposition products of wool. The silk proteins, fibroin and sericin contain only the first four elements above, lacking the sulphur of the wool. In fact, the protein molecule of silk is about half composed of glycocoll and alanine.

Classification of the Proteins

The proteins, according to their properties, are divided into three classes: (I) The simple proteins; (II) the compound or conjugated proteins, and (III) the derived proteins. The simple proteins are those occurring naturally which on hydrolysis eventually give only *a*-amino acids or their derivatives. This class includes keratin, fibroin and sericin, which are of most interest to textile chemists.

I. (*a*) *Albumins.*—Simple proteins which are soluble in water and dilute salt solutions, but coagulated by heat. Ovalbumin, serum albumin, vegetable albumins, lactalbumin, etc.

(*b*) *Globulins.*—Heat coagulable simple proteins which are insoluble in water but soluble in dilute solutions of salts of strong bases and acids. Serum globulin, edestin, vegetable globulins, amandin, etc.

(*c*) *Glutelins.*—Heat coagulable simple proteins which are insoluble in water or dilute salt solutions, but soluble in very dilute acids or alkalies. Glutenin.

(*d*) *Prolamines.*—Water insoluble simple proteins which are soluble in 80 per cent alcohol, Gliadin, hordein, zein.

(*e*) *Albuminoids.*—These simple proteins are comparatively insoluble in water and other neutral solvents, dilute acid, alkali or salt solutions. Keratin, the principal protein of wool, occurs in this group. Also elastin, collagin, fibroin of silk, etc. These are called *scleroproteins* by the English classification.

(*f*) *Histones.*—Simple proteins which are not coagulable by heat, but are strongly basic and soluble in water or dilute acid solutions. Insoluble in ammonia. Globin, scombrone.

(*g*) *Protamines.*—Strongly basic simple water soluble proteins which are not coagulated by heat, are soluble in ammonia and yield large amounts of diamino acids on decomposition. They have the property of precipitating aqueous solutions of the other proteins. Sturin, salmin, clupeine and scombrine.

II. The conjugated proteins include the (*a*) *Chromoproteins;* (*b*) *Glyco-* or *Glucoproteins*; (*c*) *Phosphoproteins;* (*d*) *Nucleoproteins;* (*e*) *Lecithoproteins,* and (*f*) *Lipoproteins,* which are not of particular interest in the study of wool and silk.

III. The derived proteins include only artificial products, including all of the decomposition products of the natural proteins. The protein decomposition products of all causes, such as chemical reagents, enzymes, heat, etc., are all included within this group, as well as the artificially synthesized proteins. It is subdivided into (*A*) *primary protein derivatives* and (*B*) *secondary protein derivatives.*

(*A*) *Primary Derivatives.*

(*a*) *Proteins.*—A derived protein from the first action of acids, enzymes, or water. Insoluble in water. Edestan and myosan.

(*b*) *Metaproteins.*—Produced by a further action of alkalies or acids. These are soluble in weak acids or alkalies, but insoluble in neutral solutions. Acid albumin (acid metaprotein) and alkali albuminate (alkali metaprotein). These are the *infraproteins* of the English classification.

(*c*) *Coagulated Proteins.*—Insoluble proteins produced by the action of heat or alcohol.

(*B*) *Secondary Derivatives.*

(*a*) *Proteoses.*—Hydrolytic decomposition products of proteins. Soluble in water, not coagulated by heat, but precipitated by saturating their solution with ammonium or zinc sulphate. Protoproteoses, deuteroproteoses.

(*b*) *Peptones.*—Hydrolytic decomposition products soluble in water but not coagulated by heat, nor precipitated by the sulphate as above. Generally diffusible and give the biuret reaction. Antipeptone, amphopeptone.

(*c*) *Peptides.*—These are polymers of amino acids of which the composition is known. They do not coagulate with heat or give the biuret reaction. They are also called di-, tri-, tetra-, penta-peptides, etc., according as they contain two or several amino acids in the molecule. The carboxylic group of one amino acid is united with the amino group of the next, etc.

Innumerable Proteins Possible

That the proteins are rather complex in character is readily seen from a study of the amino acids which form their main constituent, or "building blocks," as well as their high molecular weight.

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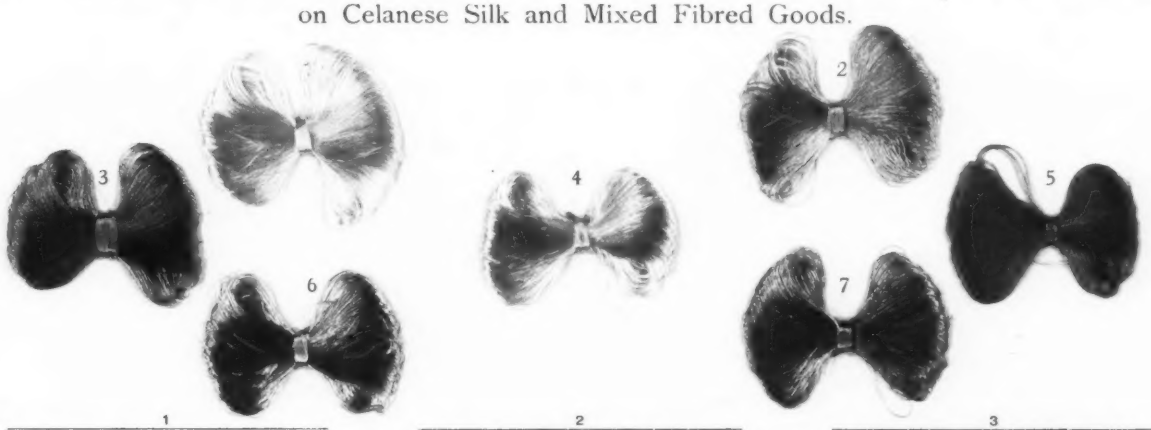

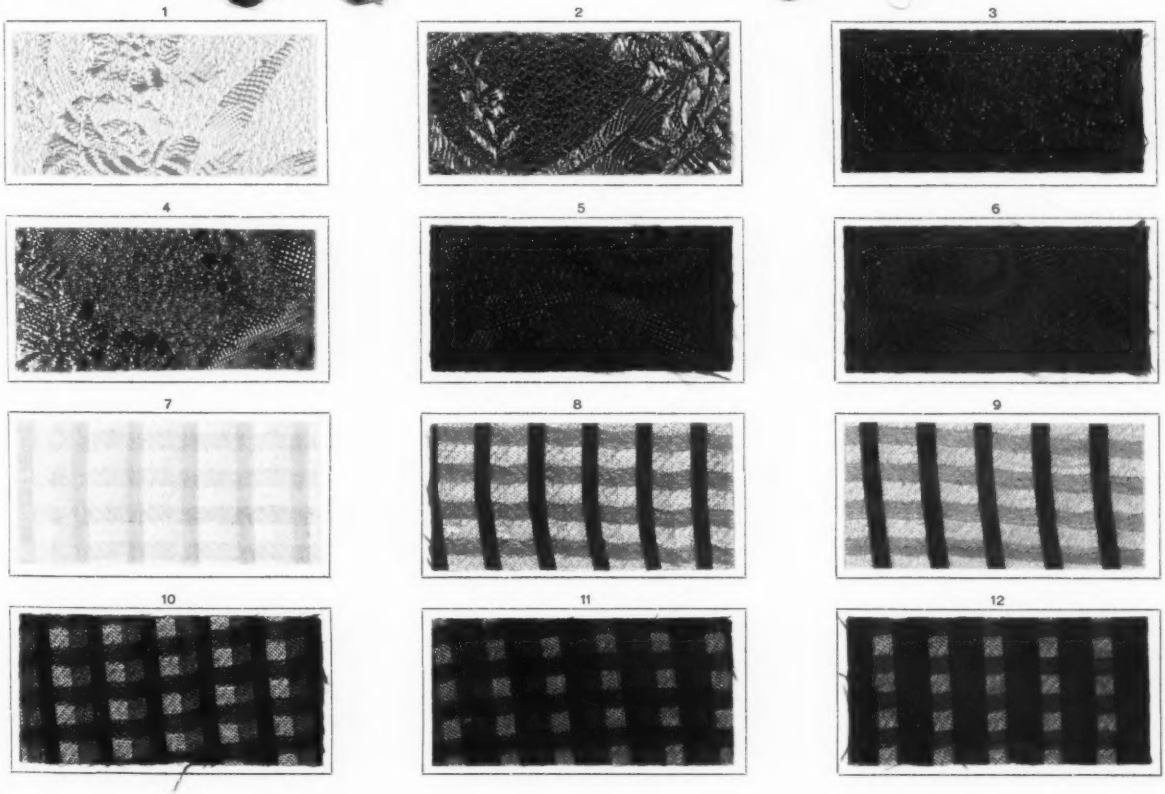

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SETACYL DIRECT COLORS.

The new Setacyl Direct Colors are particularly appreciated for their very simple dyeing process. The dyeings are generally of a good fastness to rubbing, washing and light. Besides the dyeing of pure acetate silk, the said Setacyl Direct Colors can also be used for the dyeing of mixed fabrics, to obtain two and multi-colored effects.

DYEINGS ON ACETATE SILK.

1. 3 % Setacyl Direct Yellow R Powder

2. 3 % Setacyl Direct Orange 2R Powder

3. 3 % Setacyl Direct Blue G Powder

4. 0.2 % Setacyl Direct Blue G Powder
   0.2 % Setacyl Direct Yellow GR Powder
   0.2 % Setacyl Direct Red B Powder

5. 5 % Setacyl Direct Red B Powder

6. 0.75 % Setacyl Direct Blue G Powder
   0.75 % Setacyl Direct Yellow GR Powder
   0.80 % Setacyl Direct Red B Powder

7. 1.5 % Setacyl Direct Blue G Powder
   3 % Setacyl Direct Yellow GR Powder
   2 % Setacyl Direct Red B Powder

DYEINGS ON MIXED FABRICS.

No. 1— 6 Cotton with Acetate Silk
No. 7—12 Wool, Acetate Silk, Artificial Silk and Real Silk

(One bath dyeings)

1. 5 % Setacyl Direct Orange G Powder

2. 3 % Setacyl Direct Blue G Powder
   1 % Polyphenyl Orange RC
   30 % Glauber's salt

3. 3 % Polyphenyl Black FF supra
   30 % Glauber's salt

4. 0.3 % Setacyl Direct Scarlet G Powder
   30 % Glauber's salt

5. 5 % Setacyl Direct Orange 2R Powder
   1 % Diphenyl Violet JZ
   30 % Glauber's salt

6. 8 % Setacyl Direct Red G Powder
   1 % Diphenyl Fast Scarlet RS
   30 % Glauber's salt

7. 5 % Setacyl Direct Yellow GR Powder

8. 0.65 % Erio Green B supra
   10 % Glaubers's salt
   4 % Sulphuric Acid

(two baths dyeings)

9. 0.65 % Erio Green B supra, dye same as under No. 8, rince and dye on a fresh bath with
   3 % Setacyl Direct Yellow GR Powder, same as No. 1

10. 0. 5 % Erio-Glaucine AP
    0.25 % Erio Violet BC, dye same as under No. 8, rince and dye on a fresh bath with
    1 % Diphenyl Red 8 B
    20 % Glauber's salt

(one bath dyeing)

11. 1. 5 % Neutral Blue R
    1 % Chicago Red
    1. 5 % Setacyl Direct Yellow 2R Powder
    20 % Glauber's salt

(two bath dyeing)

12. 0.65 % Erio Viridine B supra, dye same as under No. 8, rinse and dye on a fresh bath with
    0. 4 % Diphenyl Brilliant Blue FF
    2 % Setacyl Direct Yellow GR Powder
    20 % Glauber's salt

Dye without any addition or with an addition of soap. For combinations and light shades dissolve in $^1/_2 - 1$ % soap solution and then dye $^1/_2 - 1$ hour at 140—160° F, Black $1 - 1^1/_2$ hour. When dyeing Setacyl Direct Colors particular attention must be paid to the fact that for the dissolving of the said colors only *boiling condens water* is used.

For multi-colored effects in one operation use:

Art. Silk Colors C. W.	**Erio Colors**
for Cotton and Rayon	for Wool and Real Silk
(leave Celanese Silk white)	(leave Celanese Silk white)

— Without guarantee —

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Cohn, Hendry and Prentiss, *J. Biol. Chem. 63,* 721-66 (1925), estimate the minimal molecular weight of some of the proteins as follows: Gelatin, 10,300; edestin, 29,000; egg albumin, 33,800; hemoglobin, 50,000; serum globulin, 81,000, and casein, 192,000. E. V. Horne, *Biochem, J. 18,* 1107-13 (1924), states that in a three per cent gelatin solution in M/1 sodium salicylate the apparent aggregate (molecular) weight is determined by the osmotic pressure is about 16,000. This rises to about 40,000 in 0.9 per cent solutions.

With our present knowledge of proteins, it is impossible to even make a plausible guess as to the number of them we may be dealing with in nature, but in Holleman and Walker's "Organic Chemistry," we find that if we assume the protein molecule to consist of twenty different amino acid residues (17 have already been identified), it is possible that we may have approximately 2.3 trillion groupings and a like number of isomerides. Further, we know that some amino-acids contain asymmetric carbon atoms. If the protein molecule contains n of them the number of steroisomerides possible is $2n$, and assuming that n is, say, 10, each of the 2.3 trillions substances could exist in 1,024 optically isomeric forms. There are other possible variations in the constitution of the protein within the molecule and its constituents, so that it is evident that the number of possible isomerides is almost unlimited. All this would indicate that we may have some difficulty in synthesizing and exactly duplicating, or even in isolating, the various proteins found in nature.

The Albuminoids or Scleroproteins

The albuminoids, which include keratin, fibroin, collagen, elastin, etc., are the proteins of most interest to textile chemists. They yield hydrolytic products similar to those of the other proteins, thus indicating that they possess essentially the same chemical structure. They differ from the other proteins, whether simple, conjugated or derived, in that they are insoluble in all neutral solvents. The albuminoids include "the principal organic constituents of the skeletal structure of animals as well as their external coverings and its appendages." Gelatin cannot be classed as an albuminoid, on account of its solubility, although it is a transformation product of collagen.

Stary and Andratschke, *Z. physiol. Chem. 148,* 93-98 (1925), investigated the scleroproteins with respect to the distribution of nitrogen, and found that the individual scleroproteins differ more from each other than they do from ordinary proteins. The peculiar properties they have in common are probably due to other characteristics, such as anhydride linkages. Table I shows the distribution of nitrogen in six scleroproteins:

TABLE I

Nitrogen Distribution in Various Scleroproteins (Albuminoids)

Scleroprotein—	Ammonia Nitrogen	Humin Nitrogen	Diamino and Cystine Nitrogen	Monoamine Nitrogen
Human hair	7.93	2.02	28.14	61.90
Gorgonin	3.36	1.11	22.76	72.78
Spongin	6.24	1.49	14.73	77.54
Conchiolin	4.17	6.16	19.33	70.34
Byssus	5.55	4.51	16.02	73.91
Ovokeratini	3.51	2.73	20.91	72.85

As all textile chemists know, the albuminoid keratin is usually given as the principal constituent of wool, hair, fur, feathers, nails, horn, hoofs, and the epidermal layer of the skin. While many chemists appear to consider keratin as a single chemical compound of more or less variable composition, it is just as reasonable, and, in view of the most recent work, very probably more nearly correct to assume that it is a mixture of a variety of more or less closely related proteins, which with our present limited knowledge of the subject we are unable to separate or differentiate in a satisfactory manner.

Hawk, in "Physiological Chemistry," states that there is a group of keratins, the members of which have very similar properties. These keratins are insoluble in the usual protein solvents and are not acted upon by the gastric or pancreatic juices but all respond to the xanthoproteic and Millon tests. They contain comparatively large amounts of sulphur. Some recent work upon wool, especially that of Trotman, Trotman and Sutton, which will be discussed later, certainly indicates that wool is composed of at least two and possibly three proteins. Table II gives the composition of keratins from several sources.

According to Shu Oikawa, *J. Biochem. (Japan),* 5, 57-62 (1925), the keratin of the shed skin of a python has the following composition: Total nitrogen, 14.65 per cent; humin nitrogen, 0.26; monoamino acid nitrogen, 12.34; cystine nitrogen, 0.14; arginine nitrogen, 0.08, and ammonia nitrogen, 1.35 per cent. The various amino acids were present in the following proportions: Alanine, 2; valine, 2; leucine, 2; isoleucine, 0.3; phenylalanine, 2; tyrosine, 6, and glutamic acid, 0.2 per cent. No glycollol was found.

TABLE II

Composition of Keratin

Source—	Percentage Composition S	N	C	H	O
Nails[1]	2.80	17.51	51.00	6.94	21.75
Horn[2]	3.20	....	50.86	6.94	....
Human hair:[3]					
Indian	4.82	15.40	44.06	6.53	29.19
Japanese	4.96	14.64	42.99	5.91	31.50
Negro	4.84	14.90	43.85	6.37	30.04
Caucasian (adult)	5.22	15.79	44.49	6.44	28.66
Caucasian (child)	4.93	14.58	43.23	6.46	30.80

[1] Mulder, Versuch einer allgem. physiol. Chem., Braunschweig (1844-51).
[2] Horbaczewski, Ladenburg's Handworterbuch d. Chem., 3.
[3] Rutherford and Hawk, Jour. Biol. Chem., 3, 459 (1907).

Constitution

As before mentioned, according to the most widely accepted theory regarding the constitution of the proteins.

they consist mainly of *a*-amino acids in what is known as peptide linkage. This will be considered further in the next paper of the series, which will deal with the amino acids. Some idea of our present knowledge of the amino acids composing the proteins, particularly keratin, fibroin and related products, may be obtained from Table III. Most of this information was obtained by hydrolyzing the proteins by various methods, separating, identifying and estimating the resulting amino acids. Further details regarding their constitution and the methods of separating and identifying the constituent amino acids may be obtained by reference to the original sources given in the bibliography attached to the table. Table IV gives the percentage chemical composition of wool and some other animal proteins, and Table V gives a chemical analysis of wool ash from Bowman's "Textile Fibers."

In concluding this instalment upon the proteins, it is only fair to state that not all chemists accept the peptide linkage, amino acid theory as to the constitution of the proteins. In a recent paper upon the constitution of

TABLE III—THE COMPOSITION OF SOME PROTEINS

Percentage of Amino Acids Isolated from Various Proteins, Including Wool and Silk

	Edestin Hemp (1)	Cocoon Oecetieus Palensis (2)	Indian Tussah Silk Gum (3)	Italian Silk Cocoons (4)	Japanese Silk Cocoons (5)	Keratin Sheep's Horn (6)	Keratin Horse Hair (7)	Keratin Goose Feathers (8)	Keratin Hair (9)	Keratin Wool (10)	Gelatin (11)	Casein, Cow (12)	Elastine (13)	Gliadine Wheat (14)	Zein Maize (15)	Vitellin Hen Egg (16)
Glycine or Glycololl	3.80	27.19	1.50	33.59	35.00	0.45	4.70	2.60	....	0.58	16.50	0.45	25.75	0.02	0.00	0.00
Alanine	3.60	18.80	9.80	20.00	22.60	1.60	1.50	1.80	....	4.40	0.80	1.85	6.58	2.00	9.79	0.75
Valine	6.20	....	....	....	....	4.50	....	....	....	2.80	1.00	7.95	1.40	0.21	1.88	1.87
Leucine	14.50	0.75	4.80	0.75	0.70	15.30	7.10	8.00	14.00	11.50	2.10	9.70	21.38	5.61	19.55	9.87
Proline	4.10	3.20	3.00	0.80	0.70	3.70	....	....	....	4.40	5.20	7.63	1.74	7.06	9.04	4.18
Phenylalanine	3.09	1.80	0.30	1.20	1.30	1.90	....	....	....	....	0.40	3.88	3.89	2.35	6.55	2.54
Aspartic acid	4.50	0.25	2.80	1.00	1.30	2.50	0.30	1.1	(?)	2.30	0.56	1.77	....	0.58	1.71	2.13
Glutamic acid	18.84	2.35	1.80	0.25	0.07	17.70	3.70	2.30	12.00	12.90	1.88	21.77	0.76	42.98	26.17	12.95
Serine	0.33	....	5.40	1.90	0.70	1.10	0.60	0.40	....	0.10	0.40	0.50	....	0.13	1.02	(?)
Cystine	1.00	....	....	....	....	7.50	....	....	13.92	7.30	0.00	0.07	(?)	0.45	(?)	(?)
Tyrosine	2.13	0.00	1.00	9.00	9.70	3.60	3.20	3.60	3.00	2.90	0.00	4.50	....	1.20	3.55	3.37
Arginine	14.17	....	....	....	....	2.70	....	....	....	....	7.62	3.81	0.30	3.16	1.55	7.46
Histidine	2.19	....	....	....	....	(?)	....	....	....	....	0.40	2.50	....	0.61	0.43	1.90
Lysine	1.65	....	....	....	....	0.20	....	....	....	....	2.75	7.62	....	0.00	0.00	4.81
Tryptophane	+	....	....	....	....	....	....	....	....	....	....	1.50	....	+	0.00	....
Ammonia	2.28	....	....	....	....	(?)	....	....	++	....	0.00	1.61	....	5.11	3.64	1.25
Aminovaleric acid	....	....	....	....	....	....	0.90	0.50	....	....	....	....	....	....	....	....
Pyrolidine-2-carboxylic acid	....	....	....	....	....	....	3.40	3.50	....	....	....	....	....	....	....	....

	Italian Silk Fibroin (17)	New Chwang Silk Fibroin (18)	Canton Silk Fibroin (19)	Shantung Tussah Silk Fibroin (20)	Bengal Silk Fibroin (21)	Nietang-tsan Silk Fibroin (22)	Indian Tussah Silk Fibroin (23)	Tsai-tsao-tsam Silk Fibroin (24)	Chefoo Silk Fibroin (25)	Silk Fibroin (26)	Raw Sakusan Silk (27)	Raw Yamamai Silk (28)	Raw Kuri-wata Silk (27)	Raw Tussah Silk (27)	Bombyx Mori Silk Fibroin (27)	Bombyx Mori Silk Gum (27)	Canton Silk Gum (28)
Glycine or Glycololl	36.00	19.70	37.50	14.50	30.50	24.00	9.50	25.20	12.50	36.00	5.70	6.30	7.70	35.13	36.00	.1–.2	1.20
Alanine	21.00	23.80	23.50	22.00	20.00	18.50	24.00	18.00	18.00	21.00	4.80	7.20	15.30	23.40	21.00	5.00	9.20
Valine	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Leucine	1.50	1.60	1.50	1.00	1.20	1.20	1.50	0.90	1.20	1.50	1.20	1.30	7.95	1.76	1.50	....	5.00
Proline	+	1.85	1.00	2.50	1.00	1.20	1.00	1.00	2.50	....	....	....	4.00	3.68	0.30	....	2.50
Phenylalanine	1.50	1.20	1.60	1.00	1.40	1.00	0.60	1.00	1.00	1.50	....	....	....	....	....	....	0.60
Aspartic acid	+	2.90	0.75	1.00	0.80	2.00	2.50	2.10	2.00	....	1.00	1.00	0.20	....	....	....	2.50
Glutamic acid	0.00	1.70	0.00	1.75	+	3.00	1.00	2.00	2.00	....	....	0.60	(?)	6.16	....	....	2.00
Serine	1.60	1.00	1.50	1.80	1.75	1.50	2.00	1.20	1.00	1.60	....	....	....	....	....	....	5.80
Cystine	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrosine	10.50	9.80	9.80	9.70	10.00	7.80	9.20	7.80	8.50	10.00	1.40	2.00	5.50	4.20	12.00	5.00	2.30
Arginine	....	....	....	....	....	....	....	....	....	1.00	3.10	3.80	1.74	5.24	1.00	4.00	....
Histidine	....	....	....	....	....	....	....	....	....	+	2.70	1.60	1.01	....	....	....	....
Lysine	....	....	....	....	....	....	....	....	....	+	....	....	....	....	....	....	....
Tryptophane	....	....	....	....	....	....	....	....	....	+	....	....	....	....	....	....	....
Ammonia	....	....	....	....	....	....	....	....	....	....	0.60	0.80	0.80	1.16	1.05	1.87	....
Aminovaleric acid	....	....	....	....	....	....	....	....	....	+	....	....	....	....	....	....	....
Pyrolidine-2-carboxylic acid	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

proteins, N. Troensegard, *Z. Angew. Chem. 38*, 623-6 (1925), gives various partly developed lines of evidence that the proteins are probably not built up of amino acids as formerly supposed, but consist largely of pyrrole pyrrolidine and pyridine rings condensed into systems of two, three, or more, and contain oxygen as OH. Such substances would probably be easily split into amino acids. He gives the following facts against the present amino acid theory of protein constitution: (1) Hydrolysis of proteins often gives only a relatively small amount of the nitrogen as amino acids. (2) While all proteins have nearly the same elementary composition, that of the amino acids varies greatly. (3) The proportions of the various acids are not such as to lead to any classification of the proteins from which they are derived or to any possible scheme of combination in the manner characteristic of polypeptides. (4) Ring compounds have been found among the amino acids as, for instance, the glyoxaline ring of histidine, the pyrrolidine ring in pyrrolidinecarboxylic acid, and the indole group in tryptophan. Aberhalden, *et. al., Z. physiol. Chem.* 140, 92-108 (1924), and elsewhere, gives evidence that diketopiperazine rings are also present in the protein molecule as well as in most of the amino anhydrides.

(The third article in this series on wool will appear in an early issue.)

TABLE IV

The Composition of Wool and Some Animal Proteins

	PERCENTAGE OF					
	Carbon	Hydrogen	Nitrogen	Oxygen	Sulphur	Phosphorus
Lincoln wool (30)	52.00	6.90	18.10	20.30	2.50	....
Irish wool (30)	49.80	7.20	19.10	19.90	3.00	....
Northumberland wool (30)	50.80	7.20	18.50	21.20	2.30	....
Southdown wool (30)	51.30	6.90	17.80	20.20	3.80	....
Keratin (31)	50.00	7.00	22–26	15–17	2–4	....
Gelatin, commercial (32)	49.38	6.80	17.97	25.13	0.70	....
Gelatin, ligaments (33)	50.49	6.71	17.90	24.33	0.57	....
Casein, cow	53.00	7.00	15.70	22.65	0.80	0.85
Collagen (34)	50.75	6.47	17.86	....	....	....

(30) Bowman, "The Wool Fiber." (31) Matthews, "Textile Fibers." (32) Chittenden. (33) Richards and Giess. (34) Hoffmeister.

TABLE V

Analysis of Wool Ash (Bowman)

(Ash of Lincoln Wool, 1 per cent, of which 75 per cent was water soluble.)

	Whole Ash	Soluble Ash	Insoluble Ash
Potassium oxide, K_2O	31.00	42.30	trace
Sodium oxide, Na_2O	8.20	17.30	trace
Calcium oxide, CaO	16.90	4.50	51.20
Alumina, Al_2O_3			
Ferric oxide, Fe_2O_3	13.30	3.60	37.70
Sulphur trioxide, SO_3	20.50	24.80	trace
Carbon dioxide, CO_2	4.20	3.40	....
Phosphorous pentoxide, P_2O_5	trace	trace	trace
Chlorine, Cl	trace	trace	....
Silica, SiO_2	5.80	4.10	11.10

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TWENTY-NINE RECEIVE B.Sc. DEGREE AT NORTH CAROLINA TEXTILE SCHOOL

At the commencement exercises of the Textile School of North Carolina State College, twenty-nine young men who had completed the four-year course received the degree of Bachelor of Science. Of these, five were students of textile chemistry and dyeing and twenty-four of textile manufacturing. George William Dobbins, of Rutherfordton, N. C., was awarded the Student's Medal given by the National Association of Cotton Manufacturers to the student having the highest proficiency in his work for the four years. State Senator Mark Squires made the presentation.

A notable feature of the commencement was the conferring of the degree of Doctor of Science upon Dean Thomas Nelson. In awarding the degree President Brooks of the college spoke in praise of the excellent service which Dean Nelson had devoted in his successive capacities as instructor, professor, head of the department of textile manufacturing and dean of the textile school, during his twenty-five years in the North Carolina Textile School, and of his extensive textile training in England and his work in various capacities for departments of the United States Government.

During commencement week the textile alumni of the State College were hosts at a banquet in honor of Dean Nelson. During the banquet L. R. Alberts, chairman of the board of governors of the Southern Textile Association, presented Dean Nelson with a handsome chest of silver in appreciation of his service to the college.

Following is a list of the graduates:

Textile Chemistry and Dyeing—John Franklin Byrd, Henry Laton Harris, Carle Woodruff Mason, Fred Stanton Pritchard and Richard Halbert Webb.

Textile Manufacturing—Donald Milton Bailey, Walter Talliaferro Brown, Yan Chin Ching, Thomas William Church, Jr., John Murdock Currie, Charles Algernon Davis, George William Dobbins, Joseph Clarence Farmer, William Whitley Gluyas, Nelson Norfleet Harte, James Lewis Hauser, William Lilly Horne, Joseph Paisley Hughes, Edward Clifton Mitchiner, Marion Farr Palmer, Peter Warlick Patton, Henry Edward Rufty, Jr., Harry Hutcheson Redwine, Perry Manning Riff, Arthur Haskell Thomas, Edwin DeBerry Robinson, Joseph Parker Walton, Floyd Webster Warrington, Thomas Cashion White, Jr.

DR. ROWE APPOINTED TO CHAIR OF COLOR CHEMISTRY AT LEEDS

Dr. F. M. Rowe, of Warrington, editor and compiler of the Colour Index, published by the Society of Dyers and Colourists, has been appointed to the chair of color chemistry and dyeing at Leeds University, to succeed Prof. Arthur George Perkin. Dr. Rowe entered Leeds in 1908 and in 1911 was graduated with honors in color chemistry, winning the diploma in dyeing and becoming Leblanc medalist. In 1913 he joined the staff of Joseph Crossfield & Sons, Ltd., as research chemist and in 1916 was appointed lecturer on dyestuffs in Manchester University (College of Technology), also becoming reader in tinctorial chemistry and dyeing. In 1925 his original article on research work earned the gold metal presented by the Worshipful Company of Dyers, his essay being the best that had ever appeared on the subject of dyeing.

NEW ENGLAND DRYSALTERS HOLD FORTIETH ANNUAL OUTING

The Drysalters Club of New England held its fortieth annual outing at the Marlboro Country Club on June 18. The affair was marked with a record attendance and a well-rounded program of sports. Golf was naturally the chief event of the day, but in addition the members and guests participated in horse-shoe pitching contests, balloon blowing competitions and similar diversions and enjoyed a motion picture show.

H. R. Davies, president of the club, completed his term of office at this meeting, and at the conclusion of the banquet the gavel was turned over to Sidney R. David, the newly elected president of the organization. Gelston King was elected vice-president and Avery Bruce retained his office of secretary.

Prizes for the golf tournament were awarded in a manner that gave practically every player, regardless of skill, a chance to carry away a trophy. In Class A the president's trophy for the best gross score was captured by A. H. Pierce, and the cup for the best net by J. B. Cook; in class B the vice-president's trophy for the best gross was awarded to J. E. Hughes, and the cup for the best net to John O'Day; in Class C the cup for the best gross was won by Charles Bagley, and a knife for the best net by W. A. Keating. A miniature golf cup for the highest score in eighteen was presented to Dr. F. P. Summers; an ash tray for the most 6's went to John Grady; a belt buckle for the most 7's to Richard Haworth. The guest prize for the best gross score was taken by M. P. Graham and for the best net by A. E. Jenniss. The New York Members' trophy, a special award, was presented to S. R. David.

NEW TUBIZE DIRECTOR

The directors of the Tubize Artificial Silk Company of America announce the election of Edward V. Peters as vice-president of their company in charge of sales, also as a director of the company.

Mr. Peters has been for many years general sales manager of the New Jersey Zinc Company, and in this capacity has shown himself to be an outstanding figures as a sales executive and gained the confidence and esteem of everybody with whom he has come in contact.

Mr. Peters takes up his duties with the Tubize company on July 1.

BATIK

Preparation of the Cloth—Starching—Making the Design—The Crackle Technique—The Dyeing

By PETER MIJER*

WHAT a world of sins are covered by this little word, *batik*. At the present all kinds of dyeing and decorating of fabrics are given the name of batik; be it tie dyeing, mottled silk, hand-painted silk and what not, it is all presented under the name of batik. The moment a piece of material is decorated in a way not generally known, "batik" is nine times out of ten accused of the crime that has been committed.

What is batik, after all? Batik is the Malay name for hand-decorated textiles, mostly cottons, occasionally silk, through the medium of a resist process of which wax is the principal ingredient. As early as 1563 it has been known to come from the Dutch East Indies; to be more specific, from Java.

The batik art was applied only to the decoration of textiles used for the native costumes of both women and men. It is a true and characteristic sample of an Indonesian decorative art because of the application of the dyes, the colors, the fixatives and the free waxing and designing.

The making of batiks can be divided in three parts:

1. Preparation of the cloth.
2. The making of the design on the cloth.
3. The dyeing and finishing of the decorated cloth.

Preparation of the Cloth

The preparation of the cloth depends a great deal on the locality where batik work is done and on the future use of it. For very expensive batiks it is only rinsed in plain water, and afterwards boiled for one-quarter of an hour in a solution of rice, starch and water; sometimes a few bamboo leaves and some lime is added to this solution. After starching, the goods are well dried and folded flat on a heavy wooden board and padded with a wooden mallet, wrapped in cloth. This operation takes the place place of ironing. After the padding the goods are ready for the designer. When the goods have to be batiked for a better quality, it is often required to give the whole piece a ground color first, and in this case it is submerged for three days in an extract of Tegerang (*Cudrania javanensis trecul*) and alum. This is done in Jogjakarta. Another much used preparation process mostly applied in the district of Semarang is a treatment of the cotton with oil and lye. The material is dipped and kneaded in this mixture for two to five times a day during a period of from six to twelve days.

The duration of this process depends entirely on the fastness of the color that is wanted. After the cloth is dried in the sun it is boiled out in water containing the ashes of burnt rice stalks, and this is continued till the fabric is free from oil. This boiling is always done, whether the material is bleached or unbleached, for otherwise the wax would not stick to the material. This repeated oiling and drying in the sun produces a chemical reaction in the cotton material, as part of the oil, to the amount of at least 10 per cent of the weight of the cotton, stays in the pores of the cotton fiber.

Starching

After the boiling and washing the cloth is starched. For the starching of the material, starch made of boiled young rice, or flour of casave, or flour made of the marrow of the aren palm (*Arenga saccharifera labill*) is used. Sometimes a little alum is added to the starch in order to get a better soga-color. The starching of silk is more intensive on account of the porosity of the used silk on which it is impossible to batik if not starched properly. In the art of batik very thin starch was probably in use before wax. The Javanese as well as the Egyptians have treated the material with starch in the same way as wax is being used now. However, the process was impaired by several technical imperfections. The starch did not stick very well to the cloth, it did not dry as quickly as wax, and furthermore, it was not very suitable for the design of fine patterns. All these technical incompliances have been overcome by the use of wax. Beeswax was used first, but later on imported wax was in demand.

In the district of Banjoemas the so-called lilin-daoen is in use, a wax which is found on the leaves of the wild pisang kele, a banana species. The wax is almost never plain wax but mostly mixed with other ingredients. One of the other most important pieces of equipment is a little copper instrument called *tjanting*, used in drawing with the wax on the material. It is made of fine thin red copper and has one or more little spouts and a bamboo handle. The *tjanting* is specifically a Javanese invention, which developed to its actual shape from a common bamboo stick. These *tjantings* have different names according to the type of work for which they are used. About seven kinds of *tjantings* are known. There is a *tjanting* with a slender spout, used to make very fine lines and little dots; one with a larger spout is used to wax the larger parts which have to stay white in the first process, another one to cover parts that are to be completely pro-

*Head of Art Department, National Duo-Dye Company.

tected by wax. There are various other varieties that have three, five and sometimes as many as six spouts for making little rosettes and groups of dots. The *tjanting* maker makes the instrument from start to finish.

Besides the batik done entirely by hand, the native produces a decorated material known as *tjap*. The wax is printed on the material instead of being applied with the *tjanting*. A sort of die made of wood is used, on which the design is made by the insertion, edgewise, of thin strips of brass or red copper. These *tjaps* are reminiscent of the work done in Madras where a similar process has been employed since the 15th century, for the direct application of the dyes. These *tjaps* being used to save time when making borders or patterns with a regular repeat, the natives consider them inferior substitutes for the *tjanting*. There is only a comparatively small market for the work, and there are not many die-makers found at the present time, because a die is so solidly constructed that there is seldom a reorder of the same design. The *tjap* is constructed in three parts and the copper used comes in three different weights. As the *tjap* has to replace the work done by the *tjanting* the object of the tjapmaker is to replace all *tjanting* lines with strips of copper of varying sizes. To that end the strips of copper are set in a vertical position, that is, with the edges uppermost, which work requires good craftmanship and much patience.

As with the *tjanting* in batik work, where the material is waxed on both sides, so with the *tjap* does the fabric have to be printed on the reverse side as well. Thus the die-maker has to make a second *tjap* in which the design is the exact reverse of the first one. For the reproduction of a not very elaborate design, a set of thirteen to fifteen *tjaps* is required; this means with the reverse set at least 26 to 30 separate dies.

Making the Design

When the cloth is ready to be waxed the main outline of the design is sketched on the material, and when this is completed the fabric is hung over the little stand and with the *tjanting* the design is drawn in with wax, the material meanwhile being supported with the left hand. The finer parts of the design, or the filling work, are drawn in without pencil guiding lines. When one side is decorated the piece is turned around and the reverse is very carefully drawn in. With all the surfaces covered which are not intended to be blue, it is ready for the blue dye bath. This dyeing is done by the batiker herself or more often by the professional blue-dyer. If red is planned, the wax is removed from the places where this color is wanted by sponging with hot water or erased with a sharp knife. Again the material is starched with rice water, aren sugar and pulverized randoe leaves, so that the wax will not run or become soft. The parts that are to remain blue have to be recovered with wax and the piece is ready for the red dye. The dyer leaves the material in the dye solution for about two hours, dries it afterwards and repeats the dipping and dyeing from eight to ten times.

Some dyers hasten this process by using a fixative of tingi solution. Tingi, the bark of the *Ceriops candolleana arn,* contains tannin. The color of a good batik must have a warm, velvety glow and be sunfast, which is secured by the methodical, slow coloring. The color scheme ranges from very bright tones to the most intense black, through the dyeing of the fabric consecutively in different dye solutions, until the heart of the thread is saturated with the dye. This method of slow coloring is employed because of the fact that the dyes usually are vegetable dyes (although aniline is used), and therefore do not affect the tissue immediately. Indigo blue is the first color given, which exists in hundreds of varieties of shades; the intensity of the color depends wholly on the exact application of the old coloring process. Superior batik requires a correct and patient dyeing along the prescribed rules.

The Crackle Technique

On account of the rather complicated treatment of the material, the folding and the rubbing in of the dyes, the wax loosens here and there and produces the crackle. Jure beeswax, however, cracks very little and will stand the highest temperature when in the dye bath. The crackle technique is not applied on royal garments and in the eastern part of Java not used at all. Here crackle is positively considered as a sign of bad craftmanship. Only in Sala the deliberate crackling and crushing of the wax is done with the nitik pattern, which imitates with dots a textile pattern.

The way of preparing a soga or an Indigo blue dye is different in almost every part of Java, and depends also on the knowledge which the dyer has of the qualities of the vegetable dyestuffs and the fixatives.

In Patjita the following recipe of ingredients to be added to the indigo is used: ten bananas of the Musa variety, cocoanut sugar, wood from the *Meringa pterygosperma gaertn,* five boiled *Morinda citrifolia L.,* chalk, pineapple leaves and five twigs of the *Erythrina hypaphorus.* Several secret recipes are to be found also related to various superstitions. To the indigo mixture should be added a piece of chicken meat, rain water, kitchen ashes and a little kerosene. The native is convinced that, if during the blue dyeing, man and wife have an argument the indigo immediately becomes *mlengkek,* i. e., it will not acquire the desired shade nor penetrate into the cotton fiber.

The Dyeing

The batiker, after finishing the outlines of the design, procedes to do the filling work which the natives call the decorative part of the design. This also is done on both

sides of the cloth. Then follows the covering with wax of all the spots which have to remain white in the first dyeing. In order to distinguish the design from the different layers of wax, a bright wax is used for the first design and darker shades in gradation for the following ones, which process has its advantages as well for the Indigo batik as for the soga batik. The batiker will always be able to recognize the original design.

Soga is the name for the typical color of batiks made in the eastern part of Java. It is a reddish dye which produces a color ranging from ochre yellow with red to brown yellow. This red dye is made from an infusion of soga bark. One of the ingredients of the native soga mixtures is the djirek, which is not a dyestuff but a mordant. It contains aluminum salts and therefore is used as alum. Another ingredient in the galagala, a dyestuff consisting of the dried bodies of females of *Coctus cacti*, an insect native in Mexico and Central America, but artificial dyestuffs have largely displaced it.

Also are used the kembang poeloe and the sarikoening. The kembang poeloe are the flowers of the *Carthamus tinctorius L*, in which red and yellow dyestuff are found. The sarikoening are the dried, young flowers of the *Sophora japonica L* imported from China, containing a yellow dyestuff (rutine or sopherine). To make the color permanent and at the same time to obtain the much desired purple glow, the material is dipped in a bath made of a mixture of Java sugar, whiting and alum. It is left in this solution for about an hour, after which it is well rinsed and transferred to a hot water bath. The water is boiled and the wax is dissolved; the wax floating on top of the water is collected for further use. It is obvious that the composition of the soga dye varies very much. Almost every successful dyer has his own recipe, which is kept a secret.

Every day before starting the dippings, the soga dye is heated, but it must be perfectly cool when the batiker proceeds to the dyeing.

The fixative of the soga color can be applied right after the dyeing or after the melting of the wax. In this case the fixative affects also the white spots of the batik and reduces the contrast with the other colors. The white becomes pale red, light yellow or cream colored, a shade which increases the artistic value of the pattern. In Banjoemas the material is dipped in a decoction of the *Cudrania javanensis trecul*, and in Pekalongan the white background is made light yellow by a dipping in a yellow aniline solution.

The order of the proceedings is not always the same. Sometimes the wax is melted after the blue dyeing and the material starched and waxed again for the dyeing in the soga solution. The correct proceedings then are: 1, the waxing of the outlines; 2, the filling of the decorative part; 3, the waxing of the parts which have to remain white; 4, the blue dyeing; 5, the washing; 6, the melting of all the wax; 7, the starching; 8, the waxing of the parts which have to remain blue and white; 9, the soga dyeing (brown); 10, the application of the fixative bath; 11, the melting of the wax. Only three colors have been mentioned so far: blue, soga and white. But other colors may be obtained with vegetable dyestuff through an extensive use of fixatives. Take, for instance, a batik which has already the following three colors: white, light blue and dark blue. The parts which are to remain light blue and dark blue are waxed and wax is erased from the spots which have to be made yellow. The cloth is dipped in the above mentioned fixative, the *Cudrania javanensis trecul*. The result is that white becomes yellow, light blue parts light green and the dark light blue parts dark green.

Again those parts are waxed that they may not change in the soga dye and the wax is erased from some white and light blue parts. A dipping follows in the fixative baths of koedoe and djirek (the *Morinda citrifolia L.* and the *Symplocos fasciculata zo'l*). White becomes red, light blue becomes purple, dark blue becomes dark violet and the dark green parts become black. The dyer obtains by means of this long and expensive process eleven colors. Batiks in one or two colors, as produced in the Lasem and Pekalongan districts, are of course much simpler than those in which this variety of tones are required.

An essential difference exists between the Javanese and the modern method of batik. As we have seen, the Javanese batiker starts to cover with wax all the parts which will remain white and dyes the material first in the indigo mixture which produces shades of blue.

By waxing and erasing of a part of the wax he is able to produce a color of the red group after the blue dyeing, by dipping the cloth in a soga dye. The modern batiker always starts dyeing the lightest color first and works through the color plan to the darkest shade, for instance, in a piece where yellow, red and black are desired, the dye baths are arranged in the same order. It will be clear that red can be dyed over yellow, and purple can be dyed over red in its turn, while it would be impossible to produce a good blue or green on top of a previously dyed red. The modern batiker, when he wants to have opposing colors, such as blue and red, dyes first the colors of the blue group, until the darkest shade called for has been obtained and extracts then the color from the places where the shades that belong in the red group demanded. With the strong color extracted, it is possible to get the opposing colors, starting in with the lightest tones and working through to the darkest in the manner already described. Some people, however, resort to the native method of removing the wax entirely after each dipping and recovering the parts already dyed.

The Leomar Processing Corporation, of Providence, R. I., which recently started operations at 14 Murray Street, has filed plans for the construction of a one-story addition, to be used as a bleachery. Work will begin at once.

Temperature, or the Influence of Heat on Washing and Sanitation

One of a Series on Scientific Washing

Dirt and Its Reactions Under Heat—When High Temperature Is Unwise—Cause of Soap Specks—Heat in Bleaching—A Temperature Scale for Washing—Cold Water Washing—The Germicidal Powers

By F. H. GUERNSEY
Cowles Detergent Company

SHALL we deliberately banish heat from the process of removing dirt from fabrics; or shall we rather apply heat in moderation, or in generous measure, according as a consideration of all factors directs?

The study of chemistry in many of its branches teaches that chemical reactions are more swift and extensive when heat is applied, while on the contrary refrigeration, or the application of cold, retards these actions and usually stops them completely. Chemistry in the washroom, or chemistry in the kitchen, like chemistry in the laboratory, is subject to this interesting law that nature has provided. The business of cooking our wheat cakes to-morrow morning, and the business of preserving the breakfast meat while it awaits our purchase, would be in sorry plight if these laws of heat and cold should suddenly fail to hold good.

Dirt and Its Reactions Under Heat

There are many classes of dirt which are soluble in plain water. These include sugar in its various forms, prepared starch, certain portions of soil, some fruit juices, medicines, etc. In most cases their solubility in water is increased in warm or hot temperatures. Any insoluble dirt which is bound to the fabric by sticky (sugar) dirt is thus freed for removal by other means. There is a separate discussion in this series devoted entirely to "Dirt."* In it will be found many additional facts of interest relating to classifications of dirt.

In the washing process, there are many chemical reactions or combinations between dirt and the detergents used. Chief among these is the neutralization of dirt which is acid in character. Greases, for instance, always contain a certain amount of fatty acid. The heat of cooking usually increases the amount present, and during the summer months the amount of fatty acid frequently amounts to 18 per cent of the total grease present. Furthermore, much of this fatty acid is solid material at ordinary temperatures. In the wash wheel the heated liquor causes these solid fatty acids to melt and "flow," in which condition they quickly combine with the alkali present to form soap.

In some cases, were it not for the fact that good hot water was employed, it would be quite impossible to get the desired amount of soap into the solution.

*American Dyestuff Reporter, Vol. XII, page 208.

The application of heat greatly increases the solubility of soap in water, as we have all observed in the operation of the "soap tank." Even the low concentrations employed in the wheel would produce a solution too jelly-like and viscous for effective cleansing if we tried to wash at room temperature, with tallow soap.

It might be said at this point, however, that prolonged cooking of soap in the soap tank promotes decomposition and "kills" the soap to some extent. Although not pronounced in effect, it is an additional point in favor of the use of materials in dry form.

Heat Stimulates Emulsification

One of the most important physical actions in the washing process is that of emulsification. This action is quite dependent upon the surface tension of the solution. A low surface tension is most desirable and in the case of liquids or solutions, such as a soap solution, the tension decreases with the rise in temperature until the boiling point is reached. Hot water in agitation is, therefore, a better emulsifying medium than cold water agitation.

The hot water emulsion should, however, be discharged from the wheel while hot. If an emulsion of this kind should be permitted to cool off or be chilled by the introduction of cold water, the emulsion would very likely "break," the oil and grease being deposited in the goods again. In washing practice, the hot suds operation is followed by a *hot* rinse for this very reason. This practice was adopted because it "worked better" and perhaps many have never stopped to wonder "why"

Another issue to contend with at this point is the possibility of closing the pores of the fabric in the presence of much loosened dirt. Most of the dirt should be removed before the load is allowed to cool off.

When High Temperature Is Unwise

On Albumin.—As stated above, heat has its uses and abuses in the wash wheel. For instance, there is always a certain amount of albuminous dirt present in the goods. These substances have the property of coagulating at temperatures above 120 deg. Fahr., and this of course should not be allowed to take place in the fiber. A wise precaution, therefore, is to keep the temperature below this point during the early operations, or until the albu-

mins have been removed by solvent action in the alkaline bath. Temperature of 90 deg. Fahr. is perfectly satisfactory for the first bath or "break," and in fact is to be recommended whenever detergent materials are used at this point.

On Wool.—Temperatures above 120 deg. Fahr. induce felting and compactness in woolen fabrics. Silk will stand a slightly higher temperature than wool, but both classes should be separated from the cotton and linen and washed at the lower temperature.

On Soap.—Temperatures above 180 deg. Fahr. frequently induce excessive hydrolysis or decomposition of the soap. This action is usually indicated by the suds "falling." The possibility of soap decomposition may be precluded to a certain extent by the use of a safe alkaline stabilizer which exerts a protective influence on soap. Especially is this good practice in the hot rinse after suds. Care should be exercised to select a detergent in which the alkali is perfectly controlled.

The effect of heat on modified sodas should be noted. These sodas contain sodium bicarbonate as a modifying agent. Heat, as used in the soap tank or wash wheel, rapidly decomposes bicarbonate, with the formation of soda ash. The modifying action of these sodas is, therefore, largely lost through the effect of heat, and especially in the soap tank where heating is prolonged.

The remedy lies in the use of a stable alkaline detergent in which the controlling element is not destroyed by heat.

On Colors.—Colors, always a bane to the launderer, are subject to some decomposition at the higher temperatures. Moderate temperatures and careful selection of the alkaline soap stimulant are advised. All our mineral detergents carry in their composition colloidal mordants, which will prevent or diminish the tendency of certain colors to bleed.

The Cause of Soap Specks

We mentioned the use of a hot rinse to follow the last suds. The rinse should not be hotter than the load itself. Considerable soap remains in the goods at this stage, and a large volume of very hot water will tend to decompose and dilute the soap to such an extent that considerable of the fatty acid constituent (of the soap) will be deposited in the goods as "soap specks" or "grease specks." The use of a small amoun of mineral detergent in this first rinse will prevent the decomposition of the soap and eliminate the danger of speck formation.

Heat in the Bleaching Bath

There are some differences of opinion in regard to the effect of heat on bleach. However, carefully conducted experiments have shown that good results are obtained at temperatures between 120 deg. Fahr. and 160 deg. Fahr. in five minutes. These tests showed that at 160 deg. Fahr. bleaching for three minutes gave results which required five minutes at 120 deg. Fahr., and ten minutes at 60 deg. Fahr. The loss of chlorine and oxygen to the air at 160 deg. Fahr. was found to be insignificant.

To sum up this discussion on the influence of heat in washing, it can be firmly stated that heat is indispensable to good washing, but it must be used judiciously and to the best of advantage.

Temperatures exceeding 160 deg. Fahr. are not advisable in the presence of soap. A boiling temperature both tends to decompose soap and greatly retard the colloidal activity. The latter is much greater at the lower range of temperature.

Wool and silk should be washed at no higher than 120 deg. Fahr.; colors at about 130 deg. Fahr. (unless in connection with a color-protecting detergent); albumins should be removed in the break at temperatures below 100 deg. Fahr. The hot rinse after the second suds should be done at no higher temperature than the suds, preferably no higher than 170 deg. Fahr.

The following tabulation of effects produced with right and wrong temperatures should be carefully studied by every washman:

Right

The correct temperature of the water during washing performs these functions:

Melts solid fats.
Breaks up lumps of dirt.
Dissolves soap.
Stimulates emulsification.
Aids saponification.
Controls bleaching.
Promotes reaction between detergents and dirt.
Opens pores of goods.
Prevents washovers.
Saves supplies.

Wrong

When the temperature in the wheel is too high, the excessive heat causes these disturbances:

Decomposes soap into fatty acid products.
Forms soap specks.
Causes washovers.
Causes colors to run.
Sets stains.
Felts and shrinks wool.
Coagulates albumins.
Kills the suds.
Slows up the action of soap.

A Temperature Scale for Washing

There is only one way to know that temperatures in washing machines are correct, and that is through the use of a thermometer. Guessing at temperatures is dangerous, and inefficient in deriving proper action from materials.

The following temperature scale is suggested for washing operations:

Break—Not over 90 deg. Fahr. to 100 deg. Fahr.

First Suds—Not over 140 deg. Fahr. nor under 100 deg. Fahr. (for one suds work; 140 deg. Fahr. at beginning, 170 deg. Fahr. at finish).

Rinse—Same temperature as the load at this point.

Second Suds—No over 170 deg. Fahr., nor under 140 deg. Fahr. (Colored loads a 130 deg. Fahr. to 140 deg. Fahr.)

Rinse—Same temperature as the load at this point.

Bleach—120 deg. Fahr. to 160 deg. Fahr.

Sour—Normal souring at 140 deg. Fahr. to 170 deg. Fahr. (For lime speck removal, 180 deg. Fahr.)

Blue—Cold.

The Influence of Heat on Sanitation

In taking up a discussion of sanitation, with especial reference to cold water washing, we feel justified in at once taking the position that everyone is familiar with the fact that heat assists cleansing action. Heat is a detergent, or cleansing, force. Some heat at least is required to produce efficient cleansing of fabrics which are more than slightly soiled. In fact, the amount of dirt in the goods to be cleansed is almost a direct indicator of the amount of heat required to completely remove it, the highest temperature, however, being not over 190 deg. Fahr. It necessarily follows that cold water washing is not practical as a means of *cleaning* badly soiled work, such as overalls, and in many instances wet wash. The latter is especially true when washing in nets, as the superpenetration of hot solutions is indispensable.

Some Places Where Cold Water May Be Permitted

But, if intelligently used, cold or lukewarm water washing may be the means of attracting some classes of work which are not generally sent to the laundry at present. These classes would include chiefly ladies' and children's colored garments, silks, woolen sweaters, etc. The frequency of trouble with faded color due to unstable dyes is particularly suggestive of cold washing. The housewife does not usually trust these articles to the laundry, and until she can do so with safety she will never be completely "sold" on the power laundry. It so happens that these classifications are seldom oversoiled. Consequently, the real cleansing problem on the above classifications is a relatively simple one, adaptable in most cases to cold or lukewarm water methods. Many of the cotton articles are lightly starched, which fact aids materially in washing because the dirt does not have so close a contact with the fiber itself.

When Cold Water Is Used for Fugitives

There is nothing new, unique, nor patentable about washing in cold water. When one adopts it for such classifications as fugitive colors, the following fundamental considerations should be observed:

1. Proper classification to insure none but the special classes being washed cold.

2. A supply of hot water is by all means desirable, and almost a necessity.

3. Soap is less soluble in cold water than in hot water. To overcome this, those who wash any goods in cold water find it is necessary to choose a soap of low titre prepared either from red oil, non-drying vegetable oil, or a mixture of these two: The reason for this is obvious, oil soaps being softer and more readily soluble than tallow soaps.

Another means of getting around the problem of dissolving the soap in cold water and at the same time a method that permits the use of tallow soap is that of using a hot soap solution. A builder may or may not be added. When this soap solution is added to the water in the wheel, the soap is already dissolved and remains in solution in spite of the cold water. A tallow soap cannot be satisfactorily used in cold water by adding it directly to the wheel in dry form.

Of these two methods the low titre soap is the logical choice because it rinses easier, and may be used either dry or as a solution. There are a number of good low titre soaps on the market.

4. An easy rinsing assistant to the soap is required. In making this selection, safety with respect to colors and delicate fabrics must be assured, as well as efficiency.

5. All cotton goods should be soured lightly with acetic, or better still—Erusto salts. The reducing sours, such as oxalic or bisulphite may prove harmful to the colors.

What the Germicidal Powers in Washing Are

The matter of sanitation in cold water processes has come up for consideration a number of times. It might be stated that the chief germicidal agencies in a standard washing process are:

1. Chlorine bleach.
2. Heat.
3. Mechanical action.
4. Bactericidal action of the colloid-fat soap.

To speak of these briefly:

1. The important germicidal factor in the ordinary washing process is the chlorine bleach. When we realize that the classifications which are adaptable to cold water washing will not stand the application of chlorine bleach, the sanitary aspect of cold water washing is revealed as one requiring investigation.

2. For the most part, when considering the sanitation of modern washing practice, much value is attached to the "sanitation" effect of the *heat* in the washing process. This is a case of misplaced emphasis and should not be viewed too broadly or hopefully. While it has been definitely established that the heat effect in the ordinary washing process is equivalent to pasteurization, it has also been shown that it is quite ineffective upon the spore-bearing organisms, as the most virulent class of disease germs is termed.

3. There is a serious question as to the importance of mechanical action as a germicide. In the case of cold water washing, the suds carried are invariably heavier than that carried in ordinary washing and, consequently,

the effect of mechanical action (if any) is considerably reduced.

With the absence of heat and chlorine bleach in the cold water process, it will be seen then that the bactericidal action of soap and its builder alone must be depended upon as a sanitary feature.

The Two Types of Bacteria

To determine germicidal effect, it is necessary to consider the action in the case of the two types of bacteria: "spore-bearing" and "non-spore-bearing." In number, the spore-bearing type comprises the minority of the types under general observation in medical practice. It is this group which is the most hardy of the two. Typical examples of the so-called spore-bearers are anthrax germs and tetanus (lock jaw) germs. They strongly resist any attempts to destroy them and nothing but the strongest of germicides can be relied upon to remove danger of infection from the spore-bearing organisms.

Foreign Dyes Imported Through New York and Other Ports During May

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

1—THE SIX LEADING GERMAN COMPANIES

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg. near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887

4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

IMPORTS of foreign dyes through New York and other ports during the month of May totaled 392,739 pounds, with an invoice value of $343,745. Imports by ports were as follows: New York, 362,432 pounds, with an invoice value of $313,068; Albany, 20,184 pounds, with an invoice value of $22,186; Boston, 8,152 pounds, with an invoice value of $6,248; Philadelphia, 1,971 pounds, with an invoice value of $2,225.

Imports of Synthetic Dyes

	1926		1925	
	Pounds	Invoice Value	Pounds	Invoice Value
January	190,459	$184,018	403,984	$359,376
February ..	479,027	477,255	373,259	365,268
March	487,804	435,891	527,964	488,501
April	437,526	401,606	451,005	426,141
May	392,739	343,745	370,271	347,904
Total	1,987,555	$1,842,515	2,126,483	$1,987,190

Five Leading Dyes, by Quantity, Imported During May, 1926

	Pounds
Alizarin Paste	18,077
Ciba Scarlets (single strength)	13,637
Indanthrene Yellow G (single strength)	11,738
Indanthrene Blue GCD (single strength)	11,000
Ciba Red R (single strength)	10,802

Dyes and Intermediates Remaining in Bonded Customs Warehouse

	Coal-Tar Dyes and Colors (pounds)	Coal-Tar Intermediates (pounds)
July 31, 1925	775,916	1,378,837
August 31, 1925	767,431	1,363,760
September 30, 1925	709,381	1,359,717
October 31, 1925	609,750	1,055,241
November 30, 1925	521,238	746,226
December 31, 1925	633,525	758,618
January 31, 1926	703,159	763,409
February 28, 1926	596,154	855,170
March 31, 1926	447,588	896,530
April 30, 1926	359,164	928,593

Per Cent of Dyes by Country of Shipment

	1926		
	May	April	March
Germany	60.0	51.5	48.0
Switzerland	28.0	38.0	34.0
France	1.0	2.0	3.0
England	3.0	2.0	6.0
Belgium	5.5	3.5	4.0
Canada	0.5	1.0	2.5
Italy	1.0	2.0	2.0
Holland	1.0	..	0.5

Imports of Color Lakes

	Pounds	Invoice Value
January	2,773	$2,393
February	143	....
March	58	....
April	834	....
May	3,360	3,077

The dyes in this report are grouped by both Colour Index and Schultz numbers, and, in the case of those which could not be identified by either number, the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

DYES OF COAL-TAR ORIGIN

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
32	182	Brilliant Sulphon Red 10B—(S)	1,000
40	58	Chrome Orange R—(DH)	110
44	56	Nitrosamine Red Paste—(IG)	500
54	64	Sorrel Red X—(IG)	1,000
70	—	Rapid Fast Red GL Paste—(IG)	500
105	88	Acid Anthracene Brown R—(By)	542
114	94	Guinea Fast Red 2R—(IG)	200
134	125	Black JI (Janus Black I)—(IG)	200
135	126	Indoine Blue BB Powder—(IG)	25
167	154	Pilatus Chrome Brown RX—(IG)	500
200	—	Helio Purpurine 7BL—(IG)	100
225	194	Thiazine Red RXX—(IG)	500
259	233	Cloth Red B—(IG)	50
278	—	Chlorantine Fast Red 7BL—(I) Benzo Fast Red 8BL—(IG) Fast Cotton Red 8BL—(A)	2,143
282	—	Ponceau S—(I)	11
289	257	Coomassie Navy Blue GNX—(BD)	200
299	275	Diamond Black F—(IG)	50
316	273	Diaminogene Blue NA—(C) Diazamine Blue BR Conc.—(S)	4,520
317	274	Diamine Neron BBG—(IG)	100
324	—	Diazo Brilliant Orange GR Extra—(By)	200
325	—	Brilliant Benzo Violet B—(By) Diamine Fast Violet FFRN—(C)	700
327	—	Benzo Fast Scarlet 4BS—(By)	103
346	296	Cotton Yellow G Extra—(B)	300
349	—	Chlorantine Fast Yellow 4GL—(I)	2,204
357	300	Brilliant Carmine L Conc.—(B)	100
369	314	Ignamine Orange RR—(IG)	100
382	319	Chloramine Red B, 3B—(S)	4,000
409	339	Diamine Orange B—(C)	1,158
430	—	Polar Red R Conc., RS Conc.—(G)	3,306
436	358	Chloramine Brilliant Red SB Conc.—(S) Chloramine Red 8BS—(By) Chlorantine Red 8BN—(I)	2,543
441	—	Chrome Fast Yellow RD—(IG) Chromocitronine R—(DH)	551
443	—	Acid Anthracene Red G—(By)	100
487	400	Brilliant Milling Red R—(IG)	1,000
559	448	Diamine Bronze G—(IG)	200
561	449	Trisulphon Brown B Conc.—(S)	3,201
590	471	Polyphenyl Blue GC—(G)	551
645	—	Kiton Fast Yellow 3G—(I)	1,874
649	26	Triazogene Orange R Powder—(IG)	200
656	494	Auramine G—(I)	1,102
658	496	Setoglaucine—(G)	551
661	498	Turquoise Blue G—(IG)	287
664	501	Acronol Brilliant Blue—(BD)	10
667	503	Brilliant Acid Green 6B—(By) Guinea Fast Green 3B—(IG)	575
670	505	Light Green SF Yellowish XX—(IG)	100
671	506	Erioglaucine AP—(G) Erioglaucine EP—(G)	4,959
673	508	Xylene Blue AS Conc.—(S)	500
677	512	Magenta Powder AB—(IG)	2,200
680	515	Methyl Violet Base—(IG) Methyl Violet NFB—(B)	750
681	516	Crystal Violet C Conc. Crystals—(G)	110
691	523	Fast Acid Green Extra Bluish—(Gr-E)	4,480
699	531	Eriocyanine AC—(G)	1,102
700	532	Alkali Violet A Extra Conc.—(IG)	50
703	535	Methyl Alkaline Blue—(IG)	110
705	537	Methyl Silk Blue New—(G)	110
710	541	Brilliant Sky Blue 5G—(IG)	100

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
712	543	Patent Blue V—(IG)	1,000
714	545	Brilliant Acid Blue A—(IG)	
		Kiton Blue A—(I)	
		Patent Blue A—(M)	
		Poseidon Blue BR Extra—(IG)	4,548
715	546	Cyanol Extra—(C)	
		Cyanol FF—(C)	1,568
720	551	Brilliant Blue G—(By)	
		Chromoxane Brilliant Blue G—(By)	803
723	554	Chrome Azurol S Conc.—(G)	551
724	555	Aurine—(Lo)	224
728	558	Victoria Blue R Base—(I)	110
729	559	Victoria Blue B—(I)	3,306
735	564	Alkali Fast Green 3G—(IG)	
		Kiton Fast Green V—(I)	
		Xylene Fast Green B Conc.—(S)	2,551
749	573	Rhodamine B Extra (single strength)—(B)	
		Rhodamine B Extra (single strength)—(IG)	7,325
750	572	Rhodamine G Extra (single strength)—(I)	550
756	581	Fast Acid Eosine G—(IG)	25
762	—	Chromorhodine BR—(DH)	441
788	603	Brilliant Acridine Orange A—(DH)	
		Acridine Orange DHE—(DH)	1,984
789	—	Patent Phosphine GG—(I)	
		Patent Phosphine R—(I)	882
793	606	Phosphine 3R—(IG)	1,500
795	607	Runic AL Conc.—(IG)	500
797	608	Patent Phosphine RRDX—(IG)	1,000
801	613	Quinoline Yellow—(I)	
		Quinoline Yellow Conc.—(S)	
		Quinoline Yellow Extra—(IG)	2,900
814	617	Chloramine Yellow FF Conc.—(S)	
		Diphenyl Chlorine Yellow FF Supra.—(G)	751
833	—	Xylene Milling Blue GL Conc.—(S)	965
845	687	Methylene Heliotrope, Extra Strong—(IG)	500
846	688	Rosolane Paste—(StD)	50
853	—	Acid Cyanine BF—(IG)	500
861	699	Induline NN—(IG)	50
875	923	Fur Blue Black A, SA—(IG)	
		Fur Brown NZD—(IG)	
		Fur Brown P—(A)	
		Fur Gray ALA—(A)	
		Nako Black DB—(IG)	1,175
879	—	Chromazurine G—(DH)	441
884	627	Chromacetine Blue S—(DH)	220
892	635	Blue 1900 TCD—(DH)	
		Gallo Violet DF Powder—(By)	
		Modern Violet—(DH)	761
926	661	Basic Blue GO—(M)	280
927	663	New Methylene Blue N—(IG)	1,000
1027	778	Aliarine VI Extra Pure—(IG)	
		Alizarine VI Extra Pure Old—(IG)	18,077
1034	780	Alizarine Red S Powder—(B)	
		Alizarine Red W Powder—(By)	1,358
1056	—	Alizarine Emeraldole G—(By)	10
1067	804	Alizarine Blue S Powder—(B)	1,020
1071	808	Alizarine Green S Paste—(BD)	
		Alizarine Green S Paste—(B)	1,673
1075	856	Alizarine Astrol B Powder—(IG)	
		Alizarine Blue AS Powder—(By)	541
1076	859	Alizarine Direct Blue RXO—(IG)	1,000
1077	860	Alizarine Direct Blue BGAOO—(IG)	
		Cyananthrol BGAOO—(IG)	1,700
1078	865	Alizarine Cyanine Green G Ex. Pdr.—(By)	
		Alizarine Cyanine Green 3G Powder—(By)	1,548
1080	853	Anthraquinone Violet Powder—(IC)	1,000
1084	854	Alizarine Viridine FF Paste—(IG)	
		Alizarine Viridine FF Powder (s. s.)—(IG)	2,085
1085	862	Alizarine Blue Black B Powder—(By)	
		Alizarine Blue Black B Powder—(M)	1,511
1088	855	Alizarine Blue SKY Powder—(By)	
		Alizarine Sky Blue B Powder—(By)	
		Alizarine Sky Blue B Powder—(IG)	3,473
1091	—	Alizarine Rubinol 5G Powder—(IG)	
		Alizarine Rubine GW—(By)	
		Alizarine Rubine R Powder—(By)	
		Anthra Rubine B Powder—(K)	1,422
1095	759	Anthra Yellow GC Paste Fine—(IG)	
		Vat Yellow GC Paste—(B)	4,116
1097	761	Vat Orange RRT Paste Fine—(IG)	2,415
1099	763	Vat Dark Blue BOA Paste Fine—(IG)	1,936
1102	765	Vat Black BB Double Paste (s. s.)—(IG)	4,190
1104	767	Vat Violet RR Extra Paste—(B)	5,339
1106	838	Vat Blue RSP Triple Powder (s. s.)—(B)	1,500
1109	840	Vat Blue 3G Powder (s. s.)—(IG)	1,000
1113	842	Vat Blue GCD Dbl. Pst. Fine (s. s.)—(IG)	
		Vat Blue GCDN Powder (s. s.)—(IG)	11,000
1114	—	Vat Blue BCS Powder (s. s.)—(B)	
		Vat Blue BCSO Powder (s. s.)—(IG)	4,980
1118	849	Vat Yellow G Dbl. Pst. (s. s.)—(B)	
		Vat Yellow G Dbl. Pst. Fine (s. s.)—(B)	
		Vat Yellow G Dbl. Pst. Fine (s. s.)—(IG)	11,738
1120	867	Anthra Brown B Paste—(B)	852
1123	848	Anthra Gray B Powder (s. s.)—(IG)	400
1132	817	Vat Yellow GK Powder (s. s.)—(By)	1,600
1133	819	Algol Red R Extra Powder (s. s.)—(IG)	800
1138	810	Helindone Yellow 3GN Paste—(IG)	500
1139	811	Algol Yellow 3G Paste—(IG)	400
1145	834	Vat Gray GK Paste—(IG)	1,335
1149	873	Vat Brown GR Paste—(IG)	
		Vat Brown GR Powder (s. s.)—(IG)	825
1150	833	Vat Olive R Paste—(IG)	
		Vat Olive R Powder (s. s.)—(By)	3,612
1151	—	Indanthrene Brown R Paste—(By)	5,586
1152	—	Vat Brown G Paste—(IG)	2,000
1161	871	Vat Reddish Violet RRK Pdr. (s. s.)—(IG)	1,600
1162	831	Vat Red RK Paste—(B)	
		Vat Red RK Powder (s. s.)—(IG)	2,632
1163	832	Vat Violet BN Paste—(IG)	
		Vat Violet BN Powder—(B)	2,678
1169	792	Cibanone Orange R Paste—(I)	1,102
1172	794	Cibanone Black B Paste New—(I)	1,102
1173	793	Cibanone Blue 3G Paste—(I)	2,204
1184	881	Brilliant Indigo 4B Paste—(B)	5,188
1186	883	Indigo MLB/6B Powder (s. s.)—(IG)	1,500
1190	885	Brilliant Indigo B Paste—(IG)	
		Brilliant Indigo B Paste—(IG)	4,980
1196	890	Ciba Yellow G Paste—(I)	771
1202	893	Alizarine Indigo G Paste—(By)	799
1207	912	Anthra Red B Paste—(IG)	512
1211	910	Helindone Pink AN Paste—(IG)	
		Vat Rose AN Paste—(M)	1,441
1212	918	Ciba Red 3B Paste—(I)	
		Ciba Red 3B Powder (s. s.)—(I)	
		Vat Red Violet RH Paste Fine—(IG)	
		Vat Red Violet RH Powder (s. s.)—(IG)	9,213
1217	913	Vat Orange R Powder (s. s.)—(M)	
		Thioindigo Orange R Paste—(K)	1,882
1228	907	Anthra Scarlet 2G Paste—(B)	
		Anthra Scarlet 2G Paste Fine—(B)	
		Ciba Scarlet G Extra Paste—(I)	13,637
1229	908	Ciba Red R Paste—(I)	10,802

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Pure Blue R Supra—(G)	1,102
Acid Supra Blue A Powder—(IG)	500
Alkali Fast Green 10G—(IG)	300
Anthrosine B—(IG)	100
Anthosine 3B—(B)	56
Brilliant Acid Blue FF—(By)	405
Brilliant Acid Blue G—(I)	441
Brilliant Milling Blue B—(C)	
Brilliant Milling Blue B—(IG)	1,702
Brilliant Scarlet N—(IG)	300
Brilliant Wool Blue FFR Extra—(By)	1,000
Guinea Rubine 4R—(IG)	100
Indocyanine B—(IG)	
Indocyanine B—(A)	8,683
Indocyanine FF—(IG)	200
Ink Blue BITBN—(IG)	1,000
Kiton Blue L—(I)	220
Kiton Fast Red 4BL—(I)	220
Milling Orange G—(IG)	200
Neolan Black RR—(I)	441
Neolan Blue B—(I)	220
Neolan Blue BR—(I)	441
Neolan Blue RR—(I)	441
Neolan Blue GR—(I)	441
Novazol Violet B—(G)	440
Polar Orange R Conc.—(G)	3,527
Polar Yellow 2G Conc.—(G)	1,764
Silk Blue BSIC Powder—(IG)	400
Sulphon Yellow 5G—(By)	100
Sulphon Yellow R—(By)	397
Supramine Blue FB—(By)	100
Supramine Red 2G—(IG)	1,000
Supramine Yellow R—(IG)	200
Wool Blue 5B—(M)	500
Wool Fast Orange G—(IG)	100
Xylene Fast Blue FF Conc.—(S)	515
Xylene Milling Red B Conc.—(S)	500

Vat Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Anthra Orange RH Paste Fine—(IG)	1,000
Anthra Pink R Extra Paste—(M)	1,441
Ciba Pink BG Paste—(I)	3,086
Cibanone Orange 6R Powder—(I)	440
Cibanone Red G Powder—(I)	172
Grelanone Olive B Powder—(Gr-E)	62
Helindone Blue 3G—(IG)	100
Helindone Printing Black RD Paste—(IG)	5,000
Hydron Brown G Paste—(C)	
Hydron Brown G Powder (s. s.)—(C)	
Hydron Brown R Paste—(C)	
Hydron Brown R Powder (s. s.)—(IG)	3,685
Hydron Pink B Paste—(C)	
Vat Pink FB Paste—(C)	
Anthra Pink B Extra Paste—(IG)	4,748
Indanthrene Brown GG Powder (s. s.)—(By)	1,600
Indigosol 04B—(DH)	110
Indigosol Black IB—(IG)	100
Indigosol Orange HR—(DH)	44
Indigosol Pink HR Extra—(DH)	11
Indigosol Violet AZB—(IG)	25
Vat Brilliant Violet 3B Paste Fine—(IG)	200
Vat Dark Blue BGO Paste Fine—(IG)	472
Vat Golden Orange 3G Paste—(By)	1,600
Vat Gray 3B Double Paste Fine (s. s.)—(IG)	
Vat Gray 3B Powder (s. s.)—(IG)	
Vat Gray RRH (s. s.) Powder Fine—(IG)	2,251
Vat Green G Powder (s. s.)—(IG)	400
Vat Pink B Double Paste—(B)	
Vat Pink B Powder (s. s.)—(B)	
Vat Pink B Powder (s. s.)—(IG)	6,612
Vat Printing Brown R Paste—(By)	2,000
Vat Red GG Powder (s. s.)—(IG)	400
Vat Red Brown R Powder (s. s.)—(B)	440
Vat Scarlet G Extra—(S)	50
Vat Yellow GP Powder—(IG)	1,000
Vat Yellow GGK Paste—(IG)	200
Vat Yellow 3GF Double Paste (s. s.)—(IG)	800
Vat Yellow 3RT Paste (s. s.)—(IG)	
Vat Yellow 3RT Powder (s. s.)—(IG)	1,500

Mordant and Chrome Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Alizarine Gray G—(IG)	1,000
Acid Anthracene Brown PG—(IG)	2,017
Alizarine Cyanine Green 5G Powder—(IG)	25
Aliarine Fast Light Brown GL—(By)	100
Anthracene Chromate Brown EB—(IG)	500
Anthracene Chrome Blue R—(C)	100
Cromophenine FKN—(DH)	110
Cromovesuvine RA—(DH)	110
Chromoxane Brilliant Violet SB—(By)	450
Chromoxane Pure Blue B—(IG)	50
Chromoxane Violet RD—(IG)	50
Eriochrome Azurol BC—(G)	2,204
Eriochrome Violet 3B—(G)	110
Eriochrome Yellow G Paste—(G)	419
Gallophenine P—(By)	841
Metachrome Blue Black 2BX—(A)	2,495
Metachrome Brilliant Blue BL—(IG)	200
Metachrome Olive B—(M)	2,500
Metachrome Violet 2R—(M)	200
Modern Blue CVI—(DH)	55
Radio Chrome Blue B—(IG)	500
Salicine Orange 2R Conc.—(K)	50

Direct Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Benzo Fast Black L—(IG)	1,500
Benzo Fast Blue 4GL—(IG)	
Benzo Fast Blue 8GL—(IG)	1,000
Benzo Fast Brown 3GL—(IG)	550
Benzo Fast Violet BL—(By)	441
Benzo Fast Yellow RL—(IG)	985
Benzo Rhoduline Red 3B—(IG)	500
Brilliant Congo Blue 5R—(IG)	100
Brilliant Fast Blue 3BX—(IG)	100
Brilliant Pure Blue B Powder—(By)	323
Brilliant Sky Blue 8G Extra—(IG)	2,942
Chloramine Fast Orange G Conc.—(S)	500
Chloramine Light Gray B Conc.—(S)	500
Chlorantine Fast Blue 2GL—(I)	2,204
Chlorantine Fast Bordeaux 2BL—(I)	1,653
Chlorantine Fast Green B—(I)	1,102
Chlorantine Fast Violet 5BL—(I)	2,204
Chlorantine Fast Violet 2RL—(I)	1,102
Chlorazol Fast Brown RK—(BD)	500
Columbia Catechine A—(IG)	25
Columbia Catechine G—(IG)	800
Diamine Fast Brown R—(IG)	1,200
Diamine Gray G—(IG)	100
Diaminogene Blue GG—(C)	1,698
Diazanil Pink B—(IG)	100
Diazo Brilliant Blue 2BL Extra—(IG)	100

(Continued on page 435)

AMERICAN
DYESTUFF REPORTER
SWATCH QUARTERLY

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

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THE TEXTILE INSTITUTE IDEA AND RESEARCH

IT is rather disappointing to find the long-planned textile research institute transformed and narrowed into a Cotton Textile Institute, with emphasis laid heavily upon market research rather than technical. It is like the sudden dimming of an ideal and one cannot refrain from voicing a skepticism that has grown with each attempt of the textile industry to pool its interests for the common good. The term research has been stretched in its application to textiles to cover the commercial side of the industry, and during the meeting of the American Cotton Manufacturers' Association that side was kept uppermost. What at first we had expected to be an organization for the purpose of correlating the laboratory research work of the entire textile industry is now seen as a comparatively modest project for disseminating chiefly statistics of cotton production and distribution, style design and merchandising methods.

It would be unjust to say that the plan for a textile institute has wholly failed of its purpose, for as it stands the Cotton Institute will undoubtedly play a major part in the stabilization of the cotton industry; but it developed into something quite different from the original conception of such an institute. There is little encouragement in the fact that during the meeting a few far-sighted individuals really did talk about technical research; such discussion was apparently subordinate to the main issues, which revolved around the value to the industry of *statistical* research.

As a matter of fact, whether it is possible successfully to combine in a textile institute both commercial and technical interests is a debatable point. Perhaps it is best after all that in planning the Cotton Textile Institute scientific research is regarded as somewhat of a side issue. For several years groups of experienced technologists have been working steadily upon textile processing problems and dye fastness standardization and any new research movement in this direction would only travel over the same ground and duplicate much work that has already been completed by these groups. The most urgent need, as we have often pointed out, is not a new technical research institute, but wider recognition of those already in the field and, more important still, financing of their work by the entire industry.

We should like to see incorporated in the constitution of the proposed Cotton Textile Institute a provision for a technical research fund, to be disposed of by a committee whose duty it would be to determine what groups now working on technical research on cotton are most deserving of financial assistance. The wool, the silk and the rayon industries would soon emulate such benefactions and we should then see in operation what is probably the only practical method of combining commercial and technical interests for the good of the entire industry.

TURNING SUMMER DULLNESS TO PROFITS

SUMMER, "the good old summer time," time of motor tours and fishing trips, time, by tradition, of long, dull days for business, is also a time to clean up the multitude of odd tasks that remain on the list of "things to do." During the winter, while many items have been scratched off the list, others have been passed over and mentally consigned for attention to a period when gaps should appear in the daily routine. Now that period has arrived. Short it may be, too short for all that one hopes to accomplish before the wheels of routine are once more turning without interruption. But let one task be undertaken each day, or even one each week, and before normal work is resumed the odd jobs on the list will be completed and a clean page started for the fall and winter seasons.

A prominent place among the summer-time tasks should be given to the systematic overhauling of all equipment and apparatus. In the mill the tendency to postpone small duties assumes its most dangerous form in the neglect of the very tools upon which the profits depend. Now, during the gaps in the day's routine, every unit of equipment should be carefully examined with the critical eye of an efficiency expert on the warpath against waste and ancient methods. One authority maintains that every machine requires replacement just as soon as there appears another machine that can, through increased production or earnings, pay for itself in five years. It must be acknowledged that the custom of junking obsolete equipment has earned for this country the reputation of being the most industrially efficient in the world. No more worth-while task can be undertaken this summer by the dyehouse superintendent than that of checking over his processing machinery and equipment, from the big dyeing machine down to the small laboratory scale, and replacing the old and the worn with the new. Next winter's profits in the dyehouse may be determined largely by the number of new installations it is possible to make

during the summer. Thus may the summer's dullness increase the fruits of winter's business.

PROFESSOR OLNEY HONORED

Professor Louis A. Olney, directing editor of The Reporter, was honored by Lehigh University on the occasion of its fifty-eighth commencement exercises when its president, Charles R. Richards, bestowed upon him the honorary degree of Doctor of Science. In presenting Professor Olney for the degree Dr. H. M. Ullmann, head of the Chemistry Department of Lehigh Universiay, used the following words:

Mr. President: It is my great pleasure to present to you a graduate of our Department of Chemistry who has brought significant honor to this university. He came to us as a student from the State of Rhode Island where he was born of a line of distinguished colonial ancestry. He graduated from Lehigh University in 1896 with the degree of B.Sc and earned the degree of Master of Science here in 1908.

Immediately after graduation he served a year as instructor in Brown University and since 1897 has been Professor of Chemistry and Head of the Department of Textile Chemistry and Dyeing in the Lowell Textile School. His great reward as a teacher and guide of young men lies in a just pride in the relative preponderance of his former students among the leaders in textile chemistry and the dyeing industry.

As an author he has published two books and written many articles relating to the science underlying the art of dyeing and to the technology involved in the applications of science to the textile industry.

During the late war he was prominent in the councils which met the difficult situation in dyestuffs and organic chemicals.

Since 1918 he has been editor-in-chief of the American Dyestuff Reporter, the representative American journal on that subject.

From the organization of the American Association of Textile Chemists and Colorists in 1918, he has been continuously selected as its president and as the chairman of its Research Committee. This is an organization of 900 men of training and experience in their important industry.

He has repeatedly been chosen by various scientific bureaus of the U. S. Government as chief consultant in researches in the domain in which he is an acknowledged authority.

At the present time he is chairman of a committee appointed jointly by the American Chemical Society and the U. S. War Department to establish a standard dye for army uniforms.

As a good citizen he has been a leader in the civic and religious life of his community.

You know him as a loyal, helpful son of Lehigh, interested in her greater development.

I have the honor of presenting him to you to-day on recommendation of the Faculty and by vote of the Trustees for the degree of Doctor of Science, honoris causa—Louis Atwell Olney.

In awarding the degree to Professor Olney, President Richards spoke as follows:

Louis Atwell Olney, Professor of Chemistry and Head of the Department of Textile Chemistry and Dyeing, Lowell Textile School; Consulting Chemist and Technologist; graduate of Lehigh University with the degree of Bachelor of Science in Chemistry in 1896 and of Master of Science in 1908; President of the Sterling Mills; editor of the American Dyestuff Reporter; author of "Textile Chemistry and Dyeing" and "Elements of Organic Chemistry," and joint author of Rogers' "Industrial Chemistry"; assistant editor of "Chemical Abstracts"; leading authority on the chemistry of dyes and technology of dyeing; Member and President of the American Association of Textile Chemists and Colorists; Member of the American Institute of Chemical Engineers; Member of the American Chemical Society and of numerous other technical and professional organizations.

Upon the recommendation of the Faculty and with the approbation and consent of the Board of Trustees of Lehigh University, and by virtue of the authority vested in me by this Board, I confer upon you the honorary degree of Doctor of Science with all of the rights and privileges pertaining thereto. In witness whereof, I hand you this diploma and cause you to be invested with the academic insignia appropriate to this degree.

Members of the American Association of Textile Chemists and Colorists and other readers of The Reporter will join with the publisher in heartiest congratulations to Dr. Olney upon receipt of this well-merited and really signal honor. Lehigh University has been extremely chary in awarding honorary degrees; hence, the recognition by this institution of achievement deserving of the presentation of an honorary degree means far more than it would from many other universities.

A. P. H.

Sir Alfred Mond has resigned from the board of directors of the British Dyestuffs Corporation, of London, following his appointment to the chairmanship of Brunner, Mond & Co., chemical manufacturers. Sir Alfred formerly was the British Government's representative on the board of the corporation, but recently he served simply as an ordinary member.

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is part of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

ADVENTURES IN CHIFFON DYEING

By NOEL D. WHITE,
Davenport Hosiery Mills, Chattanooga, Tenn.

ABOUT the year 1908 an importing house in New York started to manufacture some of their silk goods that up to this time they had imported from France. This firm was well financed and to-day has a number of mills in several States, making hosiery, laces, veils and many novelties.

At the time of which I am writing, the firm hired a man whom we will call Mr. K. to start a weaving mill making veils and chiffons and with about twenty looms. They rented a floor in a big four-story building in Paterson, N. J.

Mr. K. engaged the services of two loom fixers and started making veils, using silk in the way I explained in one of my earlier instalments: organ warps, dyed in the gray and bright pure dye trams. He used no bright organ for selvage. The silk was dyed in the skein but he hired no dyer to do it. Also, he did not send it out to be dyed. A salesman for one of the leading dyestuff importers of those days had persuaded him that he could instruct him to use his dyestuffs and do his own dyeing successfully. All he needed was a good man who was willing to do as he was told and willing to learn. So Mr. K. hired one of his friends, a bartender, and put him in charge of his little dyehouse. His only schooling in mathematics was his occasional bookmaking for horse racing. I know that, because he himself told me so.

How much time the salesman put in in that dyehouse instructing this man I do not know, but what I learned is that whenever a lot was off color it was put into black; and, of course, black was going big in veils and they started with very few colors and as far as that line was concerned it got on fairly well.

When they started making chiffon, which was to be dyed in the piece, they prepared a number of pieces, selected their colors, rigged up a copper tank with a hand reel with rollers on the bottom to hold the piece under, and proceeded to do the dyeing according to instructions from the dyestuff salesman.

They continued experimenting, but somehow the thing did not seem to work out as expected. Their chiffon was made up in pieces of 50 yards length, 48 inches wide, I believe, and had a border both in length and across. After being finished this chiffon had to be cut in regular veil lengths, three yards long.

Now, as is easily seen, they had three kinds of goods in their chiffon; the center was very flimsy, the borders, both sides and ends, were like ordinary ribbon, and where the crossing of the borders occurred at the four corners it was as thick as heavy taffeta.

They could not get the color to penetrate the edges. As for the corners, they never could get any color on them. After two years of experimenting they knew no more about dyeing that chiffon than when they started. The salesman-instructor must have given it up as a bad job and left them to their own resources because I never saw him after I entered upon the scene. When they were at the end of their rope they decided to have someone with experience do it for them. They therefore advertised in the Paterson Morning Call for a chiffon dyer.

What I could never understand was why, in a city like Paterson, where there are so many good dyehouses, and where they could get their dyeing done so much better and cheaper, they insisted on doing it themselves; and if they wanted to do their own dyeing, why did they not hire an experienced dyer when they could have had, in Paterson, in those days, a good man for twenty or twenty-five dollars a week?

THE "JUNK" COLLECTOR

My opinion is that the dyestuff salesman was to blame for that situation. He was afraid that a dyer would not hold himself down altogether to using his wares. Mr. K., not knowing anything about dyes, and not willing to admit his ignorance, blindly let that man rule his dyehouse and naturally he made that place his dumping ground for everything he could not sell anywhere else. When I saw that ad in the Morning Call, I went to the address given and met Mr. K. In those days I was quite sure I was one of the few, if not the only one at large, who could fill that job. There were other chiffon dyers already in the country, but all of them as far as I knew were Frenchmen engaged abroad and brought here under contract. I knew a number of them in a city in western New York. A dyehouse in Paterson had also just started operations in that line, but here the operators had yet to be trained and none of them were then competent enough to take that job. I know because I was working in this new dyehouse at the time.

The first question Mr. K. asked me was, "Can you dye chiffon?" I said I could. He went into the next room and came back with a veil, handed it to me and said, "Do you think you can dye veils like this in the piece, and have the borders and the body come out the same shade?"

I told him I knew I could and went on to relate my experience of two years in the first mill in the country that attempted to manufacture and dye chiffon.

After learning that, he proposed to go to his dyehouse. When we got there he showed me how he had struggled for two years trying to dye the blasted things, following the advice of a man who was supposed to know all about the use of dyestuffs and who had told Mr. K. that he would do all the matching for him and that whenever any trouble would arise to send for him and he would come and straighten it out. When I saw his working apparatus I knew, in part, what the trouble was. I asked him to show me the dyestuffs he had, and that was surely a revelation to me. The amount of useless junk he had accumulated! Dyes totally unfit for piece dyeing. No wonder he had failed in two years' trials.

Now I want to state here that I have absolutely no quarrel with the dyestuff dealers. I know a number of them and most of them are my best friends. We have helped each other on numerous occasions, and hope to be able to do so for many years to come. But if any one of them goes to a customer and tells him he has no need of a dyer because to-day the dye manufacturers will work out his problems for him, and any man can take care of the dyeing provided he is willing to learn, he knows he is not telling the truth. Most manufacturers do not believe such a statement. They know better. But there are some who jump at the idea of having the work done cheaply. They do not realize for a long time or until they are shown, that a cheap dyer is a very expensive individual and that a good dyer is cheap at any price.

Yet there are still some like Mr. K. His boast was that he never sent out a skein of silk nor a piece to be dyed. He never mentioned how much his dyeing cost him.

But this is what happened: I took the job, ordered some suitable dyes, and told him how to prepare the pieces to be dyed. I prepared my vat. One was all I needed for my demonstration. Then I took one piece boiled off, dyed it, finished it and took it to Mr. K. That was the surprise of his life. He took it under his arm and went to New York to show it to the sales manager. The following day this gentleman paid me a visit and assured me that I had no need to look for another job as long as I lived. As I stated above, they had rented a floor in a big building to start manufacturing two years before. By now they had built a three-story concrete building not far from this place and we were starting to move in. Prospects looked good, but I never felt easy in this job. I felt all the time that Mr. K. was getting all he could learn about dyeing from me, and I can assure you I was willing to let out as little as possible.

In the meantime, someone from the New York office had gone to France, and I believe that in New York they thought, judging from the past performances of Mr. K., that there were not any good dyers in this country, and when he came back from his trip he brought with him a Frenchman to take charge of the finishing and dyeing.

I promptly made his friendship. It was easy for me because I knew French like a native, while the newcomer knew no English; but Mr. K. did not approve of that in the least. He cautioned me against letting him see the way we were doing our work and went to the extent of building a partition from floor to ceiling between our dyehouse and the part of the room the Frenchman was supposed to occupy. We laughed at that, same as lovers laugh at locksmiths. We met frequently at night, during the dinner hour and whenever we saw fit. I provided all his helpers among my French acquaintances and we were getting on famously together.

The Understudy

With the bookmaker-dyer in my compartment also, I was getting on fairly well. He could learn quickly and, with a proper instructor, would have made a good addition to the dyers' fraternity. But I disliked his methods of getting his information. If he had come to me frankly and asked me what he wanted to know, I could have made a good skein dyer out of him, but he boasted that he learned to be a dyer without ever seeing the inside of another dyehouse. He was watching my every move, adapting all of the dystuffs I ordered for my work, which I may state were just five in number. I was determined for the time being to let them learn as little as possible. I never offered to help him out in his troubles because I could see he resented it. I never could get over the feeling that my job here was only temporary. One day I decided to find out if my suspicions were well founded.

This man was supposed to take care of the skein dyeing and I was to do all the piece dyeing. One Friday night I left one piece behind which was to be dyed red. I rolled it up in a piece of cloth and told them I would dye it the following Monday. I had some business to attend to that Saturday and would not be at work. On Monday when I went to look for my piece to dye red, I could not find it. Presently my assistant came to tell me that the skein dyer had dyed that piece and such a job he had made of it! He refused to tell me anything further than to state it took them both all day Saturday and that I would hear soon enough from Mr. K., and I did.

Mr. K. came in directly and related a sorrowful tale of how the New York office had telephoned for that particular piece, and he was obliged, against his wishes, to ask the other man to dye it; that he had worked all day at it to make it presentable and made a mess of it instead, and did I think I could fix it. I asked to see the job he did and promised I would do the best I could. The skein dyer got the surprise of his life when he saw me finish that piece in about one hour. The thing was simply overdyed and all I did was to give it a warm soap to remove the excessive dyestuff he had piled on the silk.

I could not help teasing the dyer for the job he had done, and also giving him my opinion of the advisability of having each individual pursue the calling that he was best fitted for. To which he answered with some insulting remarks to me and to the rest of the Paterson dyers.

I had my mind made up on my next move. I went to the office of Mr. K. and told him of the absurdity of having a dyehouse divided in three parts, when I could easily and successfully run the whole of it; how the Frenchman had told me that he was persuaded to come there and take charge of both dyeing and finishing because there was not a good dyer in the United States, but that he was willing to do it provided he removed that other man, whom he could place in some other department where he would be more useful.

We were now manufacturing, besides veils and chiffons, laces and embroidered veils, and the Frenchman was to dye these latter because they thought nobody else could do it. As I had had some experience in that line in a factory in Brooklyn, N. Y., the Frenchman was glad to have me do it for him, and it would have been a good arrangement, but Mr. K. absolutely refused to remove his bartender friend, insisting that we both were needed there. I could not see it that way. I also could see that what he wanted was to keep me a little longer so that his friend could learn a little more and then either fire me or make it so hard for me that I would leave. I preferred to leave then and I did. Entreaties, promises and beggings were of no avail. I left.

They advertised again but there were then no more chiffon dyers at large. To be sure, they found and tried several, but none could do it. Two months later the Frenchman came to see me with the information that Mr. K. had been fired and would I take the job of dyeing for him. I was not looking for a job then, so I declined and never went back.

Work is now under way on construction of the new water-proofing building for the Lanett Bleachery & Dye Works, of Lanett, Ala. It will be of brick and concrete, 100 by 60 feet. Most of the new equipment has been purchased. J. E. Sirrine & Co., Greenville, S. C., are the engineers.

LOWELL TEXTILE SCHOOL GRADUATION

The twenty-eighth commencement exercises of the Lowell Textile School were held on Tuesday, May 8, in the school hall. A class of twenty-eight graduated, comprising seven in the department of chemistry and dyeing, six in the department of textile engineering, four in the department of cotton manufacture, ten in the department of wool manufacture and one in the department of textile design.

The program consisted of an address of welcome by President Charles H. Eames, an address on "Industry's Contribution to Human Welfare," by Col. Charles R. Gow, of the Gow Company, Boston; announcements of awards of medals and prizes for school work; conferring of degrees, and the presentation of diplomas.

In his address of welcome President Eames outlined the interesting history of the school, its purposes and its work and progress in training future textile executives and craftsmen. He paid feeling tributes to James T. Smith, clerk of the board of trustees for a score of years and active in developing the school, and to Prof. Stephen E. Smith of the department of cotton manufacturing, both of whom passed away during the year.

The list of graduates in the class of 1926 is as follows:

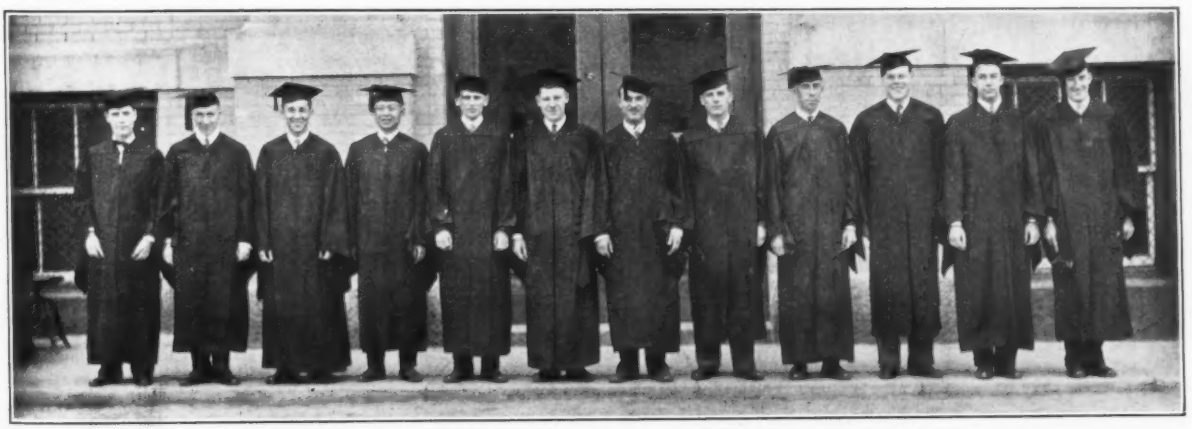
Bachelor of Textile Engineering—Franz Evron Baker, Winchendon, Mass.; Thomas Joy, Lowell, Mass.; Harold Thomas Godfrey, North Andover, Mass.; Francis Charles Kennedy, Holyoke, Mass.; Limao Kuo, Taichowfu, China, and Ehrich Ernest Max Schreiter, Walpole, Mass.

Bachelor of Textile Chemistry—Norman Spaulding Buchan, Andover, Mass.; Theodore Charles Cote, Groveland, Mass.; Philip Edwin Mason, Melrose Highlands, Mass.; Samuel Mazer, Roxbury, Mass.; William Charles Smith, Chadwicks, N. Y., and Fred William Sturtevant, Lowell, Mass.

Those receiving displomas in the various courses are:

Cotton Manufacture—William Samuel Baker, Lowell, Mass.; Alfred Francis Slamin, Wellesley, Mass.; Allen Batterman Smith, Winchester, Mass., and Harry LeRoy Swain, Jr., Kent, Ohio.

Wool Manufacture—Harold Robert Anderson, Lowell,



Lowell Textile Students Who Received Degrees

Mass.; Byron Bentley, Methuen, Mass.; John Joseph Callahan, Jr., Somerville, Mass.; Ernest Dana Gilman, Methuen, Mass.; William Tabor Hathaway, Cambridge, Mass.; George Franklin Isaacson, Waltham, Mass.; George Herbert Leavitt, Lowell, Mass.; Leslie Capron Redding, Woonsocket, R. I.; Charles Baird Teague, Somerville, Mass., and Maurice Arthur Villeneuve, Dorchester, Mass.

Textile Design—William Henry Vincent, Hyde Park, Mass.

Awards and Prizes

The Medal of the National Cotton Manufacturers' Association, presented by Russell T. Fisher, secretary, was awarded to Limao Kuo, of Taichowfu, China. The Saco-Lowell Shops prize was awarded to Francis C. Kennedy, Holyoke, Mass., and Ehrich E. M. Schreiter, Walpole, Mass. The Edward A. Bigelow prize of $100 to the member of the graduating class from the wool manufacturing department who maintained the highest standing during his three years was presented to George H. Leavitt, Old Town, Me. The Edward A. Bigelow prize of $50 to the member of the second year class of the wool manufacturing course who maintained the highest standard during the year was awarded to Edwin T. Hanscom, Sanford, Me. The Edward A. Bigelow prize of $25 to the member of the first year wool manufacturing class was awarded to Walter U. Gaudet, Pawtucket, R. I. The Louis A. Olney Book Prizes (in the form of books) of $10 and $5 to the students taking the regular course in chemistry and textile coloring who attained the highest and second highest scholarship during the first and second years, respectively, were awarded as follows: First year, first prize, Amos K. Haynes, Haverhill, Mass.; second prize, Alvin W. Bergeron, Haverhill, Mass.; honorable mention, Earl R. McLean, Haverhill, Mass. Second Year, first prize, John V. Killheffer, North Caldwell, N. J.; second prize, Paul L. Fasig, Reading, Pa.; honorable mention, Walter C. Lindsly, Lowell, Mass.

Herbert A. Currier Scholarship, $100 given by Herbert A. Currier of the Class of 1906 to a student selected by the faculty of the school, the following conditions to be considered in making the selections: Scholastic standing, financial need, and ability in promoting student activities in school life. Awarded to Daniel J. Coffey, Pittsfield, Mass.

THE FASTNESS OF COLORED TEXTILES AND PRINTING INKS WILL BE STUDIED AT THE BUREAU OF STANDARDS

The American Association of Textile Chemists and Colorists, through William H. Cady, chairman of the Subcommittee on Fastness to Light of the Research Committee, has planned a series of tests to be carried out at the Bureau of Standards, Department of Commerce, during the summer of 1926 on the fastness to light of colored textiles and printing inks. A research associate will be employed for this work by the Association and the experiments will be carried out under the direction of the dye laboratory of the Bureau.

The dyeings have been made by some twenty co-operating laboratories on cotton, wool, and silk supplied by the committee. The light exposure ratios, glass, etc., have been supplied by the Bureau. The Atlas Electric Devices Company has furnished two new "Fade-ometers" for the tests. The proofs of the printing inks have been furnished by the Department of Lithographic Research of the University of Cincinnati, through the kindness of R. F. Reed, director.

The samples to be tested will be divided into sets. Each set will be comprised of 1,047 dyeings divided equally among cotton, wool and silk colors. They represent several hundred of the important textile dyes dyed in either of two or in three strengths. The dye samples have been carefully selected and the dyeing has been done by experts in the different groups. The printing inks represent the important organic dye lakes and pigments and the inorganic pigments in several strengths. The total number of samples to be exposed is 10,710 or nine duplicate sets of 1,190 samples each.

The objects of the tests are briefly as follows:

1. To expose simultaneously a large number of useful products to a variety of daylight conditions.

2. To compare the results obtained by exposure to daylight with those obtained from artificial lamp exposures.

3. To study the effect of humidity on fading.

4. To study the rate of fading behavior of a variety of dyes.

5. To obtain a better idea of the production of "abnormal" to "normal" dyes.

6. To compare the behavior of the same dyes on different fibers.

7. To compare the behavior of printing inks with that of dyed textiles.

8. To study the standards of fastness proposed by others under different conditions of exposure.

9. To select standards to be recommended for practical fading tests.

10. To classify the common textile dyes with respect to fastness to light.

The tests to be made include the following:

Daylight Exposures:

1. Sun exposure between 9 A. M. and 3 P. M. on cloudless days; samples to be exposed at an angle of 45 deg. fasing south, under glass; simultaneously with (1) and (2).

4. Continuous exposure; sample at an angle of 45 deg., facing south, under glass.

5. The same as (4), except the sample will be in a vertical position.

6. The same as (5) except that the sample will face north.

Artificial Light Exposures:

1. Fade-ometer exposure.

2. Incandescent lamp. Incandescent lamp apparatus under high humidity.

3. Incandescent lamp apparatus with low humidity.

The exposure periods will be varied. Four exposures will be made on each sample: The second twice the first, the third twice the second, and the fourth twice the third.

Depending on the degree of fastness of the samples, samples in set (1) will be exposed for 6, 12, 24 and 48 hours to the summer sun, or 12, 24, 48 and 96 hours, or 24, 48, 96 and 192 hours. All the other sets will be judged by comparison with set (1), and the exposure will be so regulated that the average fading of the set will be equal to the average fading of set (1). In this way a simple classification into dyeings which fade more or less relative to other dyeings in comparison with the "standard" exposure will be possible. The fading will be judged visually. Later on spectrophotometric reflection measurements may be made, especially in studying the rate of fading behavior. It is expected that the tests will be started during the present month.

DYE FASTNESS TESTS COMPLETED BY U. S. BUREAU OF STANDARDS

After a long period of the most painstaking form of research work, the United States Bureau of Standards has completed its extensive natural tests for dye fastness, undertaken in co-operation with prominent textile manufacturers and associations of textile chemists, the latter group including the American Association of Textile Chemists and Colorists.

Eleven thousand samples of cotton, wool and silk have been tested for dye fastness under actual conditions of processing and exposure to various sunlights, weather and other natural color-destroying agents. It is expected that a voluminous report will be issued at an early date, outlining the results of the work with technical comment as to the effects of various sunlights on dyed material, with recommendations as to the most suitable processes to be employed in dyeing cotton, wool and silk.

The importance of this research work to the textile industry can scarcely be appreciated, even by those who will reap the greatest benefits from the data compiled.

APRIL EXPORTS OF DYEING EXTRACTS

Domestic exports of dyeing and tanning extracts from the United States during the month of April were as follows, according to advice from the Department of Commerce, 143,119 pounds, valued at $17,844; other dye extracts, 21,481 pounds, valued at $2,966; dyeing and tanning materials, crude, 991 tons, valued at $4,467; chestnut, 131,201 pounds, valued at $4,100; other tanning extract (vegetable and chemical), 2,323,397 pounds, valued at $113,017.

FOREIGN DYES IMPORTED DURING MAY

(*Continued from page* 428)

Name of Dye and Manufacturer	Quantity (pounds)
Diazo Brilliant Green 3G—(By)	551
Diazo Brilliant Orange 5G—(By)	800
Diazo Brown 3G—(By)	1,653
Diazo Fast Black SD—(By)	500
Diazo Fast Blue 2GL—(I)	110
Diazo Fast Violet BL—(By)	5,597
Diazo Indigo Blue 2RL—(By)	882
Diazo Red N8B—(I)	2,212
Fast Cotton Scarlet 4BL—(IG)	50
Formal Fast Black G Conc.—(G)	110
Minaxo Acid Brown G—(IG)	500
Paper Red A Extra—(IG)	300
Zambesi Black F—(IG)	500
Dyes for Artificial Silk	
Dispersal Yellow 3G Paste—(BD)	116
Ionamine B—(BD)	30
Rose B Extra for Acetate Silk—(IG)	50
Setacyl Direct Orange 2R Powder—(G)	220
Rapid Fast Dyes	
Rapid Fast Pink LB Paste—(IG)	200
Basic Dyes	
Acridine Red PS—(DH)	110
Acridine Yellow AO—(IG)	50
Basic Blue 6G—(Q)	73
Phosphine Orange—(G)	132
Rhodamine 6GDN Extra (s. s.)—(B)	9,285
Rhoduline Sky Blue 3G—(By)	99
Violet BB Extra—(IG)	200
Sulphur Dyes	
Cross-Dye Green B—(BD)	6,038
Kurgan Violet 3RX—(B)	200
Thional Brilliant Blue 6BS Conc.—(S)	1,000
Color Lake Dyes	
Hansa Yellow G Powder—(IG)	1,500
Hansa Yellow 5G Paste—(IG)	1,000
Hansa Yellow GR Paste—(IG)	500
Helio Bordeaux BL Paste—(IG)	2,195
Helio Fast Rubine 2BL—(IG)	100
Helio Red RMT Extra Powder—(By)	440
Paper Fast Bordeaux B—(IG)	200
Permanent Orange 2R Extra—(IG)	25
Stone Fast Orange RN Powder—(B)	200
Stone Fast Yellow GR Paste—(IG)	388
Stone Fast Yellow GR Lumps—(IG)	300
Tero Yellow FR—(IG)	500
Zapon Green G Powder—(IG)	100
Unclassified Dyes	
Kipper Brown—(Q)	10
All other dyes—(Q)	9

COAL-TAR DYES IMPORTED INTO INDIA

Coal-tar dyes imported into India decreased close to 50 per cent in 1925, the figures being 20,000,000 pounds for 1924 and 11,000,000 pounds for 1925. Despite this fact, according to Vice-Council Everett, Bombay, the imports from United States increased over 300 per cent.

The Reduction Products of Azo Dyes

Part XV

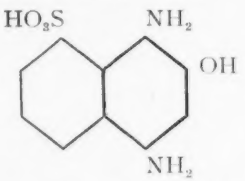
By WALTER C. HOLMES

Color Laboratory, Bureau of Chemistry

[EDITOR'S NOTE.—*The most practical and effective method for the identification of azo dyes consists in the isolation and identification of the products which they yield on reduction. This method finds less application than it might or should, partly because some of these products have never been isolated and investigated, and partly because much of the data which has been obtained in regard to such reduction products is greatly scattered aand very difficult to locate.*

Mr. Holmes has made a search for all the available information on such reduction products, and this series contains a digest o his results with a systematic listing of the reduction products of the azo dyes published in the Colour Index, together with the availabledata on suuch properties and reactions as would be of service in their identification.]

No. 174.—1, 4-DIAMINO-2-NAPHTHOL-8-SULFONIC ACID



$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. No. 10 (Crocein Yellow).

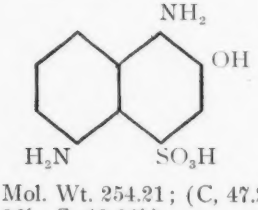
It forms a hydrochloride, colorless needles, and a sp. sol. diazo comp., green needles.

With oxidizing agents (e. g., $FeCl_3$) it yields an imido comp., brown needles with a green reflex.

It gives no dyes with diazo comps.

The N-diacetyl deriv. of the unsulfonated aminophenol melts at 250-260° (decomp.).

No. 175.—1, 5-DIAMINO-2-NAPHTHOL-4-SULFONIC ACID

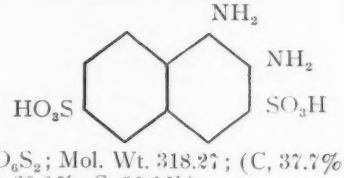


$C_{10}H_{10}N_2O_4S$; Mol. Wt. 254.21; (C, 47.2%; H, 4.0%; N, 11.0%; O, 25.2%; S, 12.6%).

Derived from C. I. Nos. 203 and 204 by complete reduction.

Apparently no data are available.

No. 176.—1, 2-DIAMINONAPHTHALENE-3, 6-DISULFONIC ACID



$C_{10}H_{10}N_2O_6S_2$; Mol. Wt. 318.27; (C, 37.7%; H, 3.2%; N, 8.8%; O, 30.2%; S, 20.1%).

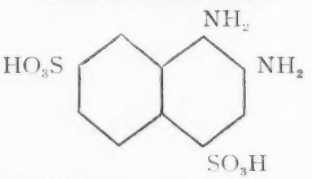
Derived from C. I. Nos. 129, 369, 377, 378, 400, 436, 438, 454, 455, 456 and 459.

Readily sol. in hot H_2O, pptted. by HCl as granular cryst. and by NaCl as fine pointed needles. Colored emerald-green by $FeCl_3$. It gives no reaction with p-nitrodiazobenzol in acid sol., and is decomposed by HNO_2 with evolution of nitrogen. With mineral acids it yields dihydroxynaphthalene disulfonic acid.

With phenanthrenequinone it yields a citron-yellow phenanthronaphthazine dye which dissolves in H_2SO_4 with a bluish fuchsin-red color, turning yellow and then orange on dil. On alk. fusion this yields a euhrodole dye, insol. in H_2O, which dissolves in H_2SO_4 with a deep green-blue color, turning violet and then Bordeaux Red on dil. and finally yielding a yellow-brown floc. pptte.

The acid Na salt of the amino acid cryst. in needles and fluoresces green in the absence of mineral acids. The acid Ca and Ba salts cryst. in small oblique prisms and are sp. sol.

No. 177.—1, 2-DIAMINONAPHTHALENE-4, 7-DISULFONIC ACID

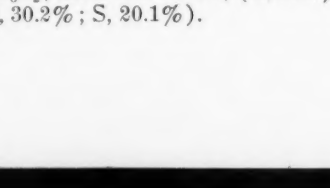


$C_{10}H_{10}N_2O_6S_2$; Mol. Wt. 318.27; (C, 37.7%; H, 3.2%; N, 8.8%; O, 30.2%; S, 20.1%).

Derived from C. I. No. 48 together with a smaller proportion of the 1, 2, 4, 6 isomer.

Apparently no data are available.

No. 178.—1, 5-DIAMINONAPHTHALENE-3, 7-DISULFONIC ACID



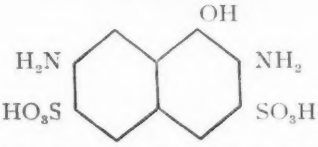
$C_{10}H_{10}N_2O_6S_2$; Mol. Wt. 318.27; (C, 37.7%; H, 3.2%; N, 8.8%; O, 30.2%; S, 20.1%).

Derived from C. I. Nos. 527 and 528.

Very sp. sol. micros. cryst. or leaflets. Unaltered by mineral acids. Alk. fusion yields 4, 8-diamino-2-naphthol-6-sulfonic acid. With *p*-nitrodiazobenzol in acid sol. it gives a red sol. It gives a sp. sol. clear yellow tetrazo comp.

Na salt, needles, sol. in 21 parts H_2O at 15°.

No. 179.—2, 7-DIAMINO-1-NAPHTHOL-3, 6-DISULFONIC ACID

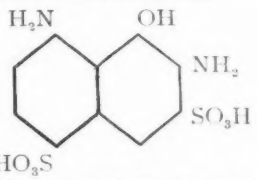


$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

Derived from C. I. Nos. 34, 553, 554, 561, 569, 570, 575 and 577.

Apparently no data are available.

No. 180.—2, 8-DIAMINO-1-NAPHTHOL-3, 5-DISULFONIC ACID

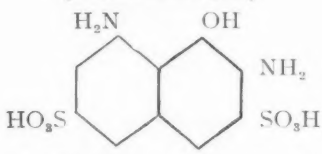


$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

Derived from C. I. Nos. 33, 404, 407 and 475.

Reported as suitable for application as a photographic developer. Reactions reported (by Green) as very similar to those of 2-amino-H-acid.

No. 181.—2, 8-DIAMINO-1-NAPHTHOL-3, 6-DISULFONIC ACID
(2-Amino-H-Acid)



$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

Derived from C. I. Nos. 30, 99, 294, 306, 397, 401, 402, 405, 406, 468, 469, 472, 476, 477, 519, 520, 525, 542, 549, 550, 552, 554, 558, 559 and 590.

Readily sol. in H_2O. The ammon. sol. on filter paper turns bright orange in air and gives a blue spot with HCl quickly becoming more violet with a magenta rim. The aq. sol. is turned Bordeaux Red (or blue-violet turning magenta) by $FeCl_3$, and yellow-red by bleaching pdr. sol. It is not diazotized in acid sol. With phenanthrenequinone it gives a yellow dye, sol. in Na_2CO_3 sol. from which it may be salted out, which dissolves in H_2SO_4 with a cornflower-blue color.

Hesse employs the following tests in distinguishing between the various amino derivs. of H-acid:

(1) Boil with a few drops of 40% NaOH and dil. with 1 c.c. H_2O.

(2) Warm with 2 or 3 drops conc. H_2SO_4 until it begins to turn violet, add 1 or 2 drops .5% $NaNO_2$ sol., cool, dil. with .5 c.c. H_2O, nearly neutralize with 40% NaOH and make alk. with excess of sat. Na_2CO_3 sol.

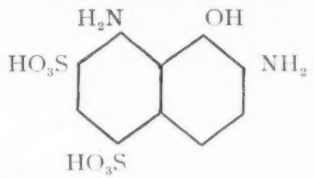
(3) Dissolve in 1 drop sat. Na_2CO_3 sol., add 1 drop conc. HCl, dil. with .5 c.c. H_2O, heat to boiling and cool. Place drop on filter paper and add 1 or 2 drops H_2O_2 sol.

(3a) When max. color has developed in test 3 add drop 40% NaOH sol.

The color reactions of 2-amino-H-acid in these tests are: (1) yellow or brown, (2) blue-red, (3) brown or yellow and (3a) red.

It has been reported as suitable for application as a photographic developer.

No. 182.—2, 8-DIAMINO-1-NAPHTHOL-5, 7-DISULFONIC ACID

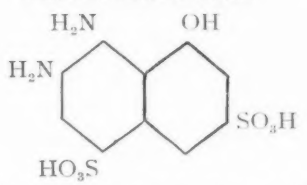


$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

Derived from C. I. Nos. 512, 517 and 518.

Readily sol. in H_2O. The ammon. sol. on filter paper behaves like that of 2-amino-H-acid. The reaction with $FeCl_3$ is also the same. The AcNaO sol. on filter paper becomes dull green in air, subsequently turning pink. The green color gives a gray-blue spot with HCl.

No. 183.—7, 8-DIAMINO-1-NAPHTHOL-3, 5-DISULFONIC ACID

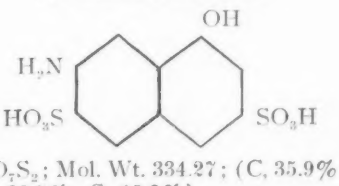


$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

Derived from C. I. Nos. 339 and 418.

Apparently no data are available.

No. 184.—7, 8-DIAMINO-1-NAPHTHOL-3, 6-DISULFONIC ACID



$C_{10}H_{10}N_2O_7S_2$; Mol. Wt. 334.27; (C, 35.9%; H, 3.0%; N, 8.4%; O, 33.5%; S, 19.2%).

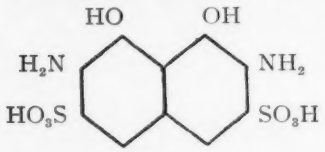
Derived from C. I. No. 348.

The color reactions in Hesse's tests (see No. 181) are (1) green, (2) blue-red, (3) violet to red and (3a) white or cream-colored.

By condensation with phenanthrenequinone it yields a phenanthronaphthazine dye which dyes wool pure yellow, is readily sol. in H_2O or alkalies and dissolves in H_2SO_4 with a green-blue color. (The practicability of this condensation as a test is questioned by Hesse.)

No. 185.—2, 7-DIAMINO-1, 8-DIHYDROXYNAPHTHALENE-3, 6-DISULFONIC ACID

(Diamino-Chromotropic Acid)

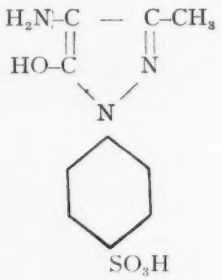


$C_{10}H_{10}N_2O_8S_2$; Mol. Wt. 350.27; (C, 34.3%; H, 2.9%; N, 8.0%; O, 36.5%; S, 18.3%).

Derived from C. I. No. 600.

No data available.

No. 186.—1-p-SULFOPHENYL-3-METHYL-4-AMINO-5-HYDROXYPYRAZOLONE

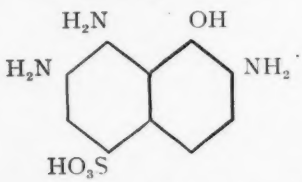


$C_{10}H_{11}N_3O_4S$; Mol. Wt. 269.22; (C, 44.6%; H, 4.1%; N, 15.6%; O, 23.8%; S, 11.9%).

Derived from C. I. Nos. 636 and 650.

No data available. The unaminated comp. forms crystals, is sl. sol. in Ac HO, alc. and H_2O, is insol. in ether and decomp. at 320°.

No. 187.—2, 7, 8-TRIAMINO-1-NAPHTHOL-5-SULFONIC ACID

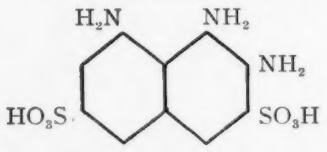


$C_{10}H_{11}N_3O_4S$; Mol. Wt. 269.22; (C, 44.6%; H, 4.1%; N, 15.6%; O, 23.8%; S, 11.9%).

Derived from C. I. Nos. 584, 595 and 599.

No data available.

No. 188.—1, 2, 8-TRIAMINONAPHTHALENE-3, 6-DISULFONIC ACID



$C_{10}H_{11}N_3O_6S_2$; Mol. Wt. 333.28; (C, 36.0%; H, 3.3%; N, 12.6%; O, 28.8%; S, 19.2%).

Derived from C. I. No. 398.

No data available.

ANNUAL OUTING OF THE S. O. C. M. A.

The annual outing of the Synthetic Organic Chemical Manufacturers' Association was held on June 10, 11 and 12 at Briarcliff Manor, N. Y., under the direction of its president, Dr. Charles H. Herty. About seventy members and guests were present.

At the dinner on Thursday evening, June 11, the guest of honor and principal speaker was Marcello Segre, of the Bonnelli Inca, Italy. He spoke on "The Status of the Dye Industry in Italy," and emphasized in particular the change in policy in the handling of reparations dyestuffs in Italy. Formerly, he said, import duties on reparations dyes entering the country were returned to the shippers when the dyes were reshipped for export. Regarding this practice as distinctly detrimental to the interests of the Italian dye industry, the present Government stopped the refunding of the import duties. Under this ruling the purchase of reparations dyes in Italy is not so attractive and this has brought about a marked decline in the volume. Approximately 1 per cent of the dyes imported into the United States during May were from Italy, Dr. Segre said.

During the following days of the outing golf, tennis and water sports tournaments were the features, and handsome prizes were awarded to the winners in each event.

GEIGY COMPANY HEAD CELEBRATES HALF CENTURY IN BUSINESS

Robert J. Keller, president of the Geigy Company, Inc., celebrated on June 18 his fifty years' connection with the company as well as the fiftieth anniversary of his business career. Although the firm has changed its name from time to time the name Geigy has been continuously on its books during these fifty years.

Different departments of the company presented Mr. Keller with numerous bouquets, and he received from some of the older employees a gold fountain pen and an emblazoned testimonial signed by all members of the organization as a token of affection, and from the officers of the firm a Swiss platinum watch. A luncheon was served, during which Mr. Keller was congratulated and extended best wishes for continued good health and for his continuance as president of the Geigy Company for many years in the future.

The New York State Department of Labor is instituting a campaign to educate the students in continuation schools within the State in matters of first aid and safety in industrial occupations. There are some fifty thousand minors under sixteen and non-graduates of elementary schools under seventeen who are required by the laws of the State of New York to attend schools while occupied in industry. This large group is to be taught accident prevention.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XXI

(*Continued from page* 412)

Two-Sided Padder—Its Construction and Operation—Advantages and Features

By RAFFAELE SANSONE

THE plant illustrated in Fig. 1 permits the topping of only one side of the fabric during each passage, requiring a second passage if it is also necessary to color the back of the material. Should it be required to conduct topping on both sides of the cloth during one passage, the installation shown in Fig. 2 would offer better advantage.

The illustration shows a light short iron frame (F), of considerable width, sustaining an upper copper-plated iron bowl (A) and a lower copper-plated iron bowl (B), the first of which is placed on the front of the machine and the second at the back.

Against bowl A press two small India-rubber rollers (a and b), the first of which serves to regulate the elimination of the liquid that cannot be taken up by the engraving, delivering this automatically into channels at the two ends of the said bowl, from where it makes its way later to a small collection trough. The second small cylinder (b) serves only to press the material to be colored against bowl A. The position of the two rollers (a and b) is regulated through the action of the screws f and g. The first of these moves a rectangle in which passes the fabric being treated (C). A long sprayer tube delivers a fixed quantity of a solution of the basic topping color, received through a tap from an upper placed copper vessel.

Against bowl B press the small India-rubber rollers c and d, the uppermost of which (c) prevents all excess of dye liquor not entering in the incision on the said bowl from passing on its unengraved portion, delivering it also to a single collection trough. This roller is also supported by a rectangle allowing the passage of the cloth (C). Above bowl B is a second spraying tube (r), receiving a regulated quantity of the basic color solution from the tap of a second upper copper vessel.

Both bowl A and bowl B are supplied with a long continuous engraving throughout their surface, of equal depth all through and closed off by two thick projecting collars of equal height and quite smooth surface. Several other bowls of equal diameter to the above are available with the plant, having incisions of different depths, which are employed in place of the first, in accordance with the quantity of bath to be dyed on the material.

Bowls A and B have their axles in ball bearings. These keep them in a rigid position all through. Also the small pressing rollers a, b, c and d have their end shafts carried in ball bearings.

The cotton cloth that has been previously dyed in the direct colors is taken up in this instance from a long low wooden table (T) and is carried upward to light iron arms (G) projecting from frame F. Here, through contact with several separation bars, it is smoothed and delivered downward to a guide-roller (o), passing after this with its front against bowl A and with its back against bowl B, and descending further into a lower story or cellar.

In this it enters through door t into a closed rectangular iron case (D), to be clutched by the clips of a pair of endless chains (J) and run many times up and down on the double series of guiding wheels m and w. At the end of case D the clips release the

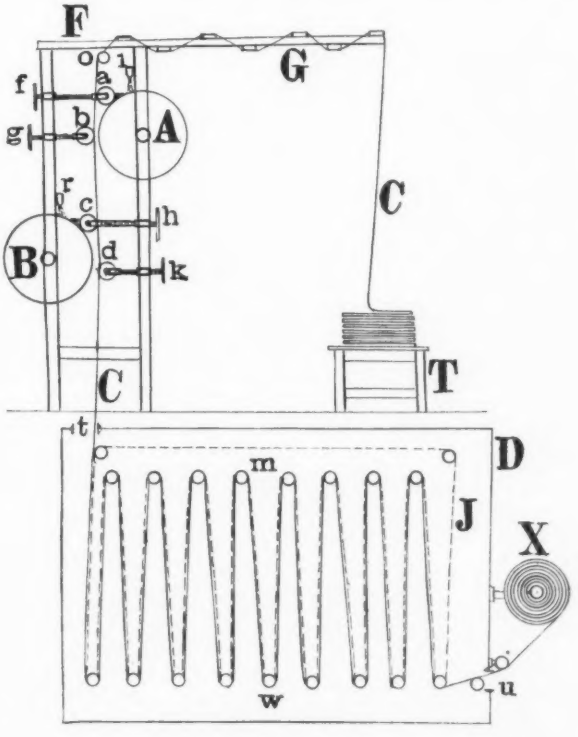


FIG. 2

material, which passes out by opening u and is wound in a dry condition on wooden beam X.

Dryer D is heated by hot air prepared in a small separate plant containing a furnace heated by a wood fire, a petroleum fire or by electricity, as may be most convenient. The hot air is introduced at the bottom and makes its way upward through a ventilator placed on the outside.

The two frame sides (F) are so arranged as to remain parallel, and several iron rods placed at different heights keep them solidly together. Bottom plates of a certain thickness, embedded in a large cement plate, fix such sides to the pavement of the works. The frames, by their special construction, are accessible to the operatives from all sides, and every position of the machine and the different portions of the cloth can be observed even during working.

Operation of the Machine

Work in the above case is somewhat different from that of many other plants, and would require a certain practice at the beginning before being conducted to the fullest advantage. The machine is well cleaned with a small quantity of hot weak soda lye to remove from the engravings on bowls A and B and the pressing rollers all residues of previous operations or of dust or grit if they have already been cleaned.

After the above important operation, a short piece of waste cotton is entered in the plant, its end being introduced between the nearest clips of the pair of endless chains (J). After this the most suitable pair of bowls to be employed for the dyeing operations are chosen, and these are started at the proper speed for guaranteeing production with minimum employment of time, labor, motive power and dye bath.

Should the best speed at which the dyeing operations have to be conducted not be known, the dyer uses a large waste piece of bleached cotton cloth from the start, preferably of equal thickness and texture to that of the fabric to be treated, and runs this through the machine, at first at the greatest speed possible, then at a medium speed, and then at a slower speed, observing, as the dried material makes its way through the plant, which speed is most convenient for the engravings chosen and material used.

After some experimentation in this way, the dyer should be able to arrange a table indicating the most convenient speed to be employed for various kinds of fabrics, thus avoiding the necessity of preceding the dyeing operations each time by speed trials. Besides the above table, another can be prepared showing the approximate volume of dye bath necessary per yard of very light, light, medium and heavy fabrics per yard of tight texture fabrics, etc., of different widths, so that after consulting these the dyer prepares just what bath he needs, avoiding useless waste of bath.

After the entrance of the waste piece of cotton cloth in the machine, hot air is let in at the back of the plant, causing this to pass through dryer D and placing soon after in movement the ventilator to guide it upward and provide a regular circulation.

As the end of the waste piece is passing on the bars of arms G, it is followed by the beginning of the first piece to be topped in fully spread condition, bringing this in contact with the wet surfaces of the bowls A and B, which rapidly cover its back and front with a thin layer of the topping colors. The cloth then enters oven D, where the intensive action of the hot air causes each layer to dry rapidly without penetrating too deeply by the time the cloth is wound on beam X. In this way a surface topping is conducted, leaving the center of the material still in the bottoming color. When one piece nears the end, the operatives sew on the beginning of another, following this by other pieces until the lot is completed.

Advantages of the Plant

The above plant possesses a certain number of advantages, some of which can be indicated as follows:

1. The cotton fabric can be given a very light topping so as to just cover the ground color, allowing this to reflect more or less strongly through the basic color layer.

2. The cotton fabric can be strongly topped, covering the ground color almost completely or completely.

3. The topping can be done on both sides of the piece with the same color, with two different shades of the same color or with two different colors.

4. The topping bath can be made to penetrate all through the material, if necessary, by lengthening the time of contact.

5. The material can be treated with bowls A and B running at the same speed or at different speeds, while bowl A can contain an engraving of equal depth to that of bowl B or of a different depth.

6. The production in topped cloth is large and the consumption of the basic color bath quite small.

7. Through a careful working it is not necessary to add a thickening agent in the topping bath, in many cases.

8. The topped cloth is dried in a straight position and slightly above its gray width.

9. Through the small India-rubber pressing rollers (a and c) being larger than the cloth running through, there is no danger that this is colored more deeply toward the borders.

10. By disposing the engraving on the bowls A and B it is possible to do line topping, stripe topping, etc.; a certain amount of thickening agent is, however, required in this case in the topping baths.

Technical Notes from Foreign Sources

Dyeing Woolen Piece Goods

Two notes are contained in the Bulletin Societe Industrielle Mulhouse, Vol. 91, pages 618 and 619-620, relating to a process for the dyeing of woolen piece goods evenly, and for printing woolen piece goods with the aid of direct coloring matters without the necessity of steaming.

In the first place, when the woolen piece goods are being dyed in a winch machine, unevenness of the dyeing is prevented by retarding the rate of the absorption of the coloring matter. To do this the following method is employed: The woolen pieces are introduced into a cold dye liquor which contains sodium carbonate. The temperature of the dye liquor is then increased to 30 deg. Cent., and then a sufficient quantity of sulphuric acid is added in order to reduce the alkalinity of the liquor to one-half of its original strength. At this point the pieces of goods in the dye liquor are merely stained. At a temperature of 35 deg. Cent. the dye liquor is made slightly acid by the addition of a further quantity of sulphuric acid, whereupon dyeing proceeds at a more rapid rate.

Subsequently dyeing is continued at the boiling temperature, the dyed pieces being afterward washed and dried.

For the dyeing of nine pieces (each 45 yards in length) of woolen delaine, a dye liquor which contains 122 grams of tartraine, 125 grams of Lenafuchsin SB, 68 grams of Cyanine B and 8 kilograms of sodium carbonate is employed, two successive additions, each of 4 kilograms of sulphuric acid of 65 deg. Be. (density 1.82), being made.

In the second note, referred to above, woolen pieces are padded with a thickened dye liquor which contains a direct coloring matter and a small quantity of sodium chloride. Then the goods are dried and successively passed through two acid baths, the first containing a cold and the second a hot ½ per cent solution of sulphuric acid at a temperature of 80 deg. Cent. The goods are afterward washed and dried. The duration of the immersion in each acid bath is one-half a minute.

The resulting shades are particularly even. Suitable padding liquors contain 80 liters of water, 20 liters of dextrin thickening, 1 kilogram of salt and 130 grams of Diamine Fast Blue FFB, 8 grams of Benzo Fast Red 8DL and 52 grams of Diamine Yellow CP or 350 grams of Diamine Blue FFB, 80 grams of Brilliant Fast Blue 4G and 8 grams of Diamine Yellow CP.

Testing Artificial Silk

In the German journal, Zeitschrift fuer angewandte Chemie, 1926, Vol. 39, pages 196ff, there is discussed the tensile strength and elongation of the artificial silk fiber and its connection with the humidity in the air. It was found that the tensile strength of the single fiber of artificial silk is reduced to the extent of 25 per cent in a damp atmmosphere; that is, where the humidity is 86 per cent, as compared with a dry atmosphere, where the humidity is 52 per cent. On the other hand the elongation before breaking is increased to the extent of 30 per cent. The figures are 40 per cent and 20 per cent, respectively, when the fiber is completely soaked in water. For a strand composed of twenty-seven fibers, the loss in tensile strength of the wet silk is 57 per cent, while no change occurs in the elongation.

Textile Fibers and Their Behavior Toward Colloidal Solutions

An investigation was made to determine the behavior of textile fibers toward colloidal solutions, such as solutions of soap, Turkey Red oil and the like. In this investigation the wetting properties of aqueous solutions which contain soap, such as Turkey Red oil, Turkey Red oil and tetracarnite, Bauechol (a proprietary wetting-out agent), Bauechol and tetracarnite, and tetracarnite, were compared. The wetting properties of these substances and mixtures were determined by the degree and rapidity with which the solutions tinted with Benzopurpurine 4B ascended vertically suspended cotton and woolen yarns. Measurement was also made of the surface tension and the viscosity by means of a stalagmometer and Ostwald's viscosimeter, respectively. Another method employed was the degree of spreading of drops of the solution along a single horizontal cotton thread, and finally the vertical depth of drops of the solutions suspended from a horizontal band of cotton threads was also measured. It must, however, be said that the results obtained were inconclusive. (Z. Deut. Oel. u. Fett Industrie, 1926, pages 81-84.)

Dyeing of Wool with Vat Colors

After discussing the development of the use of vat dyes for the dyeing of woolen fabrics, the author describes the newest vat dyestuffs which are employed for this purpose. These colors come in the paste form and up to the present have been yellow, red, brown, blue, violet and gray. They are made in Leverkusen, Germany.

The treatment of the wool and the dyeing process is very simple. The color in paste form is added with constant slow stirring to a vat which has previously been admixed with ammonia and hydrosulphite, and

which is maintained at a temperature of 50 to 55 deg. Cent. Thereafter some glue or gelatine is added to the liquor. The reduction of the coloring matter preparatory to dyeing takes place very rapidly through the entire mass of dye liquor.

It is best to carry out the dyeing process in two stages, each operation lasting about thirty minutes. These wool dyes can be admixed with each other with great ease, and also with other colors, such as the helindon dyestuffs.

One deviation in the dyeing process is brought about by the fact that Wool Vat Blue B and Wool Vat Gray 2B are not suited for dyeing in the acid bath. These wool vat dyes will be best absorbed when the dye liquor is alkaline. The effective alkali is principally ammonia in this case, so that a vat liquor which is not clear can be improved only by the addition of ammonia and eventually of a little hydrosulphite as well. An excess of ammonia does not injure the woolen materials, even when the dyeing process is carried out at a temperature of 50 to 55 deg. Cent.

If the wool vat colors are combined with Indigo, it is found that the best results are obtained with Wool Vat Yellow, Red and Brown. The new dyestuffs have been found to give perfectly satisfactory results when used on carded wool, and also when employed in machine dyeing. In the latter case more ammonia and hydrosulphite are required than when the dyeing is accomplished by dipping the woolen materials in a basket into the dye liquor by hand. The reason for the excess ammonia and hydrosulphite is to prevent the decomposition of the liquor during its circulation.

Wool Vat Violet after dyeing is acidified with acetic acid or sulphuric acid at a temperature of 70 deg. Cent., the operation lasting fifteen to twenty minutes. This treatment allows the clear reddish violet final color to be obtained very quickly.

When the wool, after being dyed, is thoroughly washed in running water, then when the wool vat coloring matters are employed acidification is not necessary, but it is better to give the materials a treatment with cold acetic acid after the oxidation of the dyestuff.

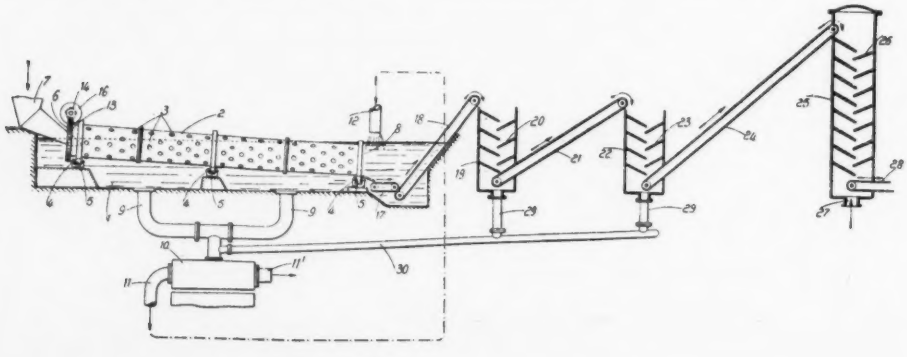
The oxidation of the color takes place quickest at an elevated temperature when the loose woolen material, after having been thoroughly squeezed, has been allowed to remain in baskets subjected to these elevated temperatures. Yarns, after they have been squeezed, are hung up to oxidize. Steaming is used to produce rapid oxidation of the coloring matter. Old vat liquors can be used without any fear, and this is even true of liquors which have been allowed to remain for a long time. All that is necessary is to heat the liquor up to a temperature of 50 to 55 deg. Cent. and add the correct proportions of ammonia and sodium hydrosulphite. Inasmuch as the liquors are almost completely exhausted after the woolen materials have been passed twice through them, there is no danger or loss involved in allowing the liquor to run out of the vats at the close of the second passage of the wool through it and then use the containers for other purposes. (Deutsche Faerber Zeitung, 1925, pages 425-426.)

Washing Machine

The washing machine patented in German Patent No. 426,182, and shown in the accompanying illustration, consists of a rotating drum open at both ends. This part of the apparatus is connected with a drying device in such a manner by means of conveyors that it is not necessary to use hand labor for carrying the goods from one part of the apparatus to the other, as is customary with most washer-drier installations.

The vat 1, seen in the accompanying illustration, is filled to a certain height with hot water. A drum 2, which is open at both ends, is located in the vat on the rollers 5. The drum has perforations 3 over its entire circumference. The connections 9 are shown at the bottom of the vat, through which the dirty water is allowed to flow into a separator 10, from which the purified water, which is again heated to the proper temperature, is permitted to flow into the vat through the connection 12.

The method of washing is as follows: The goods are first fed into the drum through the funnel 7. The slow revolution of the drum allows the washed fabrics to emerge slowly at 8, and at this point they are caught by the conveyor 18, which raises them to the upper part of the tower 19. The fabrics are dropped into the tower and come in contact with the projections 20, which has the effect of removing a part of the water that is contained in the materials. At the lower end of the tower 19 the fabrics are again caught by a conveyor and moved to the top of a similar tower 22, in which there are also similar projections 23. Thus in this tower an additional portion of the water in the



fabrics is removed. The goods are caught by the conveyor 24 at the bottom of the tower 23 and are lifted up to the top of the large tower 25. This tower is closed with an airtight cover and also possesses projections 26. The height of this tower is twice the size of the towers 19 and 22. The tower 25 is connected at its lower end with a hot-air pipe 27. The stream of hot air passes up the tower and dries the fabrics which fall from one projection to the next. When the fabrics reach the bottom of the tower 25 they are perfectly dry, and they are then removed from the tower on the conveyor 28.

RECENT PATENTS

Method of Spotting Yarn

(1,584,335; May 11, 1926)

E. Van Ness, Elmira, N. Y.

A method of spotting a mass of yarn wound in a regular manner, which consists in injecting a limited quantity of dye into the mass from each of a series of points located along a surface of the mass at such distance from each other than the portions of the mass dyed by the injections at adjacent points join each other.

Coloring-Matter Paste

(1,584,202; May 11, 1926)

Ernst Theobald, Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin- & Soda-Fabrik, Ludwigshafen-on-the-Rhine, Germany.

As new articles of manufacture, organic coloring matters, insoluble in water, in the form of an aqueous paste containing a small amount of precipated manganese compounds.

Method of Sizing Cellulose Fibers

(1,585,469; May 18, 1926)

Judson A. DeCew, New York, N. Y.

A method of sizing paper pulp, which consists in treating the fibers while in the beater with sulphate of alumina and adding a stream of size emulsion to the fibers as they are entering the Jordan engine.

Apparatus for Chemical Production and Research

(1,586,508; May 25, 1926)

Marcus Brutzkus, Zurich, Switzerland.

An apparatus for producing chemical materials, comprising, an externally driven compressor having a piston adapted to take in predetermined quantities of reagents, to compress the reagents up to the necessary pressure and temperature according to the chemical reactions involved, and after completion of the chemical reactions, to discharge the products, and to take in a new charge of materials to be acted on.

Waterproof Shade Fabric

(1,586,189; May 25, 1926)

William E. Fletcher, Philadelphia, Pa., assignor to Atlas Powder Company, Wilmington, Del.

As an article of manufacture, a base consisting of lightweight sized or filled fabrics, and a flexible, elastic and waterproof film of a pyroxylin material upon each side thereof, said film being so thin that the total weight thereof does not exceed one ounce per square yard.

COLOR HARMONY CHART ISSUED BY THE TEXTILE COLOR CARD ASSOCIATION

A chart of color harmonies, showing authoritatively which of the new shoe and hosiery colors may best be worn with the new millinery and garment colors has been prepared by Margaret Hayden Rorke, managing director of the Textile Color Card Association. It is enclosed in the 1926 Fall Season Hosiery Card. The chart also contains a key to the hosiery colors, showing exactly what stocking tints may be best worn with the new shoe shades.

Eight new hosiery colors for the fall were introduced by the Textile Color Card Association at the Hosiery Show at the McAlpin Hotel, Wednesday, June 9. These, with fourteen other tried and fashionable shades, constitute the new Fall Season Hosiery Color Card now ready for distribution.

KLIPSTEIN ISSUES BOOKLET OF TEXTILE CHEMICAL PRODUCTS

"For Yarn and Fabric" is the title of an attractive booklet recently issued by A. Klipstein & Co. It contains a list of the products manufactured by the company for the textile industry's use, with a brief description of their properties and application. The first sixteen pages are devoted to the various Akco oils, softeners, sizing and fulling compounds and finishing chemicals. There is a list classifying the products according to the industries in which they are used, which should be very useful for quick reference. The remaining pages contain a list of Akco dyes of all classes and a list of general textile chemicals, and the last page has an index to the contents of the booklet.

DU PONT ANNOUNCES TWO ADDITIONS TO PONTAMINE COLORS

Two new direct colors, Pontamine Brilliant Violet B and Pontamine Diazo Yellow 2GL, have been developed by the Dyestuffs Department of E. I. du Pont de Nemours & Co. and recently placed on the market.

The Brilliant Violet B is said to be an entirely new color, chemically, producing bluish shades of violet with

unusual brightness. It is described as level dyeing, easily soluble, and having good penetration, and may be used on practically all types of machines. It is also suitable for dyeing on the padder. In light shades, according to the announcement, it is very fast to washing, but like most direct colors, bleeding occurs in medium to heavy shades. It is particularly adapted for the production of lilac and heliotrope shades. In the dyeing of unions it is necessary to shade the wool with neutral dyeing acid colors. Celanese threads are left unstained. On pure silk brilliant reddish violets are obtained. Rayon is dyed a bluish violet. On pure silk its fastness to washing is claimed to be very good.

Pontamine Diazo Yellow 2GL is a new brilliant yellow, said to possess many advantages over the pre-war type. It is described as having extremely good fastness, solubility and level dyeing properties and as only slightly sensitive to metals. Its exhaust is also said to be good. It dyes yellow direct, with very little change on diazotation and development. It can be used on all types of cotton in any stage of manufacture and is a most useful dyestuff, according to the description, for coloring silk and rayon, as clear shades of good brilliancy are obtained. Celanese is left unstained when dyed by the usual methods. On half-silk, when dyed in a neutral bath, both fibers are dyed practically the same shade. Excellent white discharges, it is further claimed, can be obtained with the use of Sulpoxite C.

NEWPORT ANNOUNCES NEW DIRECT YELLOW

Newport Direct Fast Yellow WBF is the name of a new product announced by Newport Chemical Works, Inc. A leaflet describing its application and fastness properties and showing the shade on swatch bows of cotton and rayon is being distributed by the Newport Company.

This new Direct Yellow is said to find extensive use for the production of rich golden yellow shades, particularly on piece goods, either on the continuous machine or on the padder. Described as of good solubility, penetration and leveling qualities, slow exhaust and high tinctorial power, it is said to combine the dyeing qualities most desired in a color of this type. It is also satisfactorily dyed in closed type machines and open tubs. Rayon and pure silk are dyed practically the same.

NOIL PRODUCES DIRECT BROWN

A new addition to the products of Noil Chemical & Color Works, Inc., is Noil Direct Brown CN, said to be distinguished by its brilliance of shade and tinctorial strength. It is described as possessing excellent fastness to heat, acids and alkalies and to be level dyeing. It is recommended both as a self-color and for combinations and for dyeing cotton wool unions.

GEIGY ISSUES SETACYL COLOR CARD

Enclosed with this issue of The Reporter is a new card issued by Geigy Company, Inc., showing the Setacyl Direct Colors on seven bows of Celanese and twelve swatches of mixed goods. The swatches are especially attractive samples of one and two bath dyeings on cotton with acetate silk and on mixtures of wool, acetate silk, viscose and real silk. The combinations exhibited are designed to show the variety of pleasing effects that may be obtained on mixtures of Celanese with other fibers by means of the Setacyl colors used in conjunction with wool and silk colors. Dyeing directions for each bow and swatch are given on the reverse of the card.

The City Dye Works, of Akron, Ohio, formerly located at 760 Washington Street, are now carrying on operations at 905 Main Street. They do job dyeing of sheeting, drill, duck, etc., having a capacity for turning out 10,000 yards of goods per day. The works have one boiler and generate 100 h.p. steam power. E. C. Becker is owner and manager.

The York Bleachery & Dye Works, Inc., of York, Pa., recently formed to operate a local plant, will be represented by Mary K. Ulmer, R. F. D. No. 7, York, who has also been elected treasurer of the company.

The Sayles Finishing Plants, Inc., of Philipsdale, R. I., have filed plans for the erection of a one-story addition to their water-treating plant, 17 by 32 feet, at Bourne Avenue and Roger Williams Street.

SITUATION WANTED

Experienced colorist; seven years' experience in matching and testing dyestuffs on all textile fibers and paper. Address Box 343, American Dyestuff Reporter.

BUSINESS OPPORTUNITY

Business executive with thorough experience in the chemical, pharmaceutical and allied field wishes to become financially and actively interested in manufacturing enterprise specializing in few products, or in well-established import-export business in need of additional capital for expansion. References will be furnished and all answers treated strictly confidentially. Address Box 344, American Dyestuff Reporter.

SITUATION WANTED

Colorist with extensive experience in the application of all classes of dyestuffs on rayon, cotton and silk. Broad knowledge of vat colors and their application on all textile fibers. Address Box 345, American Dyestuff Reporter.

Hard Water Processed

Highly magnified cotton fibre showing lime soap curds deposited on it by the hardness in water.

Soft Water Processed

Highly magnified cotton fibre showing clearly how clean the fibres look when processed in Permutit softened water.

What Manufacturing Troubles are Hidden in YOUR Water Supply?

You would be astonished to know how many of the manufacturing troubles that are blamed on impure soaps, bleaching agents, dyes and other supplies are, in fact, traceable to slight impurities in mill water supplies. Regardless of the character of your products, water plays an important part in their production, and it is surprising what trouble very slight amounts of impurities in water will cause.

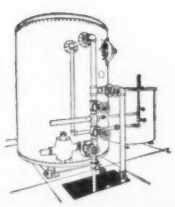
Just the other day, for example, the superintendent of a very well known Southern mill traced the cause of some faulty goods to a small amount of hardness in his water supply. He had always considered the water to be one of his mill's greatest assets—yet it actually proved to be the cause of a lot of trouble.

Do you, perhaps, fully appreciate how very small an amount of hardness in water will make trouble for you? Just look at the two photomicrographs at the top of this page. That on the left is a single fibre of cotton that was boiled off in ordinary water. See the lime soap curds that have deposited upon it due to a small amount of hardness in the water. You can't get good results from fibres like this.

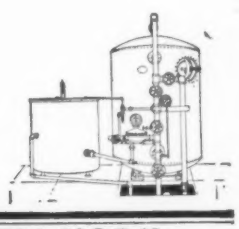
Now look at the one on the right. This cotton fibre was boiled off in water made absolutely soft and pure. It is clean and free from all natural dirt and hard water deposits. Fibres like this enable you to get the best possible results.

But are you sure of the water in YOUR mill? Are you absolutely certain there is nothing in it that might account for defects of one sort or another in your products? Thousands of dollars have been saved yearly by textile mills of every character, who have recognized this danger, and have examined their water supplies closely, as other raw materials are examined.

Solving water problems is our specialty. We have helped many managers and superintendents overcome some tough manufacturing difficulties, and our booklet, "Reducing Textile Costs and Troubles," contains a lot of valuable information that every mill man should have. It will pay you to read it. Let us send you a copy—it's free. Write today.



Permutit
water softeners
Take all the hardness out of water



The PERMUTIT COMPANY - 440 Fourth Avenue - NEW YORK

Carbic Color & Chemical Company, Inc.

INDIGOSOL O INDIGOSOL O4B

Aniline Colors—Chemicals

451-453 WASHINGTON STREET NEW YORK CITY

Branch Offices: Philadelphia, Providence, Boston

SOLE AGENTS FOR DURAND & HUGUENIN S.A., PASLE, SWITZERLAND

Your General Store—

IN the general store of the dyeing industry goods are both bought and sold. It is the market where buyers come for used machinery —dyeing machinery, extractors, washers, bleaching kiers, mercerizing machines, surplus chemicals, dyehouse supplies. Those who have such goods to sell find it *profitable* to dispose of them here.

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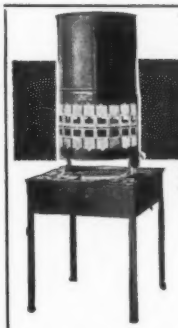

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Index to Advertisers Appearing in This Issue

American Aniline Products, Inc. III
American Cellulose & Chemical Mfg. Co. XVIII
American Rapidase Co. XXII
Amid Duron Co. IX
Arabol Manufacturing Co. XVII
Arkansas Co. XXIII
Arnold, Hoffman & Co. XXI
Atlas Electric Devices Co. XXIII

Borne, Scrymser Co. IX
Bosson & Lane XXI

Campbell, John, & Co. V
Carbic Color & Chemical Co. XX
Ciba Co. ..... —
Corn Products Refining Co. X
Cowles Detergent Co. ..... —

David, S. R., & Co. ..... —
Dorr Co. XIII
Dunker & Perkins Co. XXIII
Du Pont de Nemours, E. I., & Co. ..... VII, VIII
Dyer & Calico Printer ..... —

Fleischmann Co. ..... —
Foster, Edward C. ..... —
Franklin Process Co. ..... —

Geigy Co., Inc. ..... Front Cover, XI, XII
General Dyestuff Corp. IV

Hunter, James, Machine Co. ..... —
Hussong Dyeing Machine Co. ..... —

Innis, Speiden & Co. XIV
International Salt Co. ..... —

Jennings & Co. ..... —

Kali Manufacturing Co. XXII
Klipstein, A., & Co. ..... Second Cover

Lewis, John D. ..... —

Malt-Diastase Co. XXII

National Aniline & Chemical Co. ..... XV, XVI
Newport Chemical Works ..... Back Cover
New York Color & Chemical Co. V

Oakley Chemical Co. X
Onyx Oil & Chemical Co. XXII

Permutit Co. XIX

Roessler & Hasslacher XIV
Rohm & Haas Co. VI

Sandoz Chemical Works ..... —
Society of Dyers and Colourists ..... Third Cover
Solvay Process Co. XX
Suter, Alfred XXIII

Textile Finishing Machinery Co. ..... —
Tolhurst Machine Works ..... —

Union Color & Chemical Co. ..... —
United Aniline Co. XIV
United Chemical Products, Inc. VI
U. S. Color & Chemical Co. XXI

Vellner, Eugene XVII

Wolf, Jacques, & Co. ..... —

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